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DECEMBER 1949

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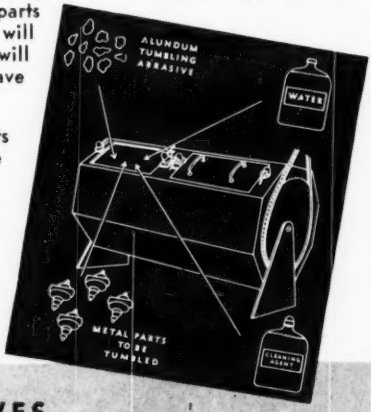

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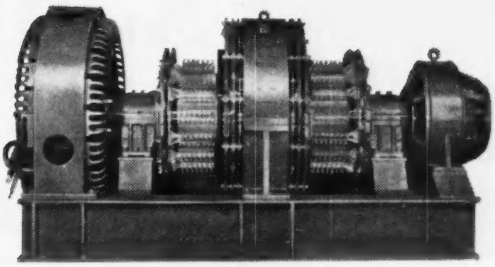

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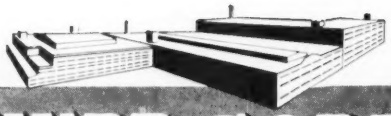

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SERVING INDUSTRY SINCE 1902

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Products Finishing

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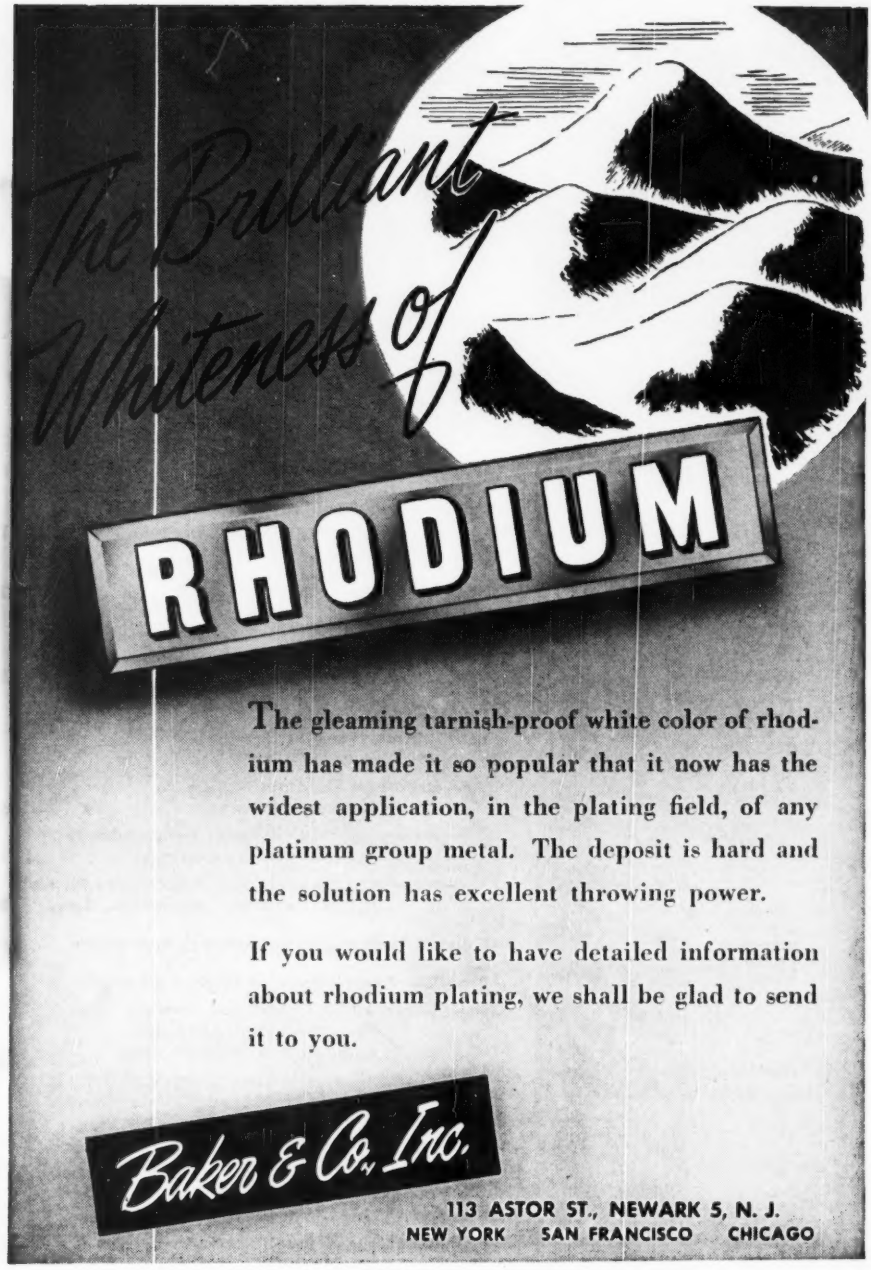
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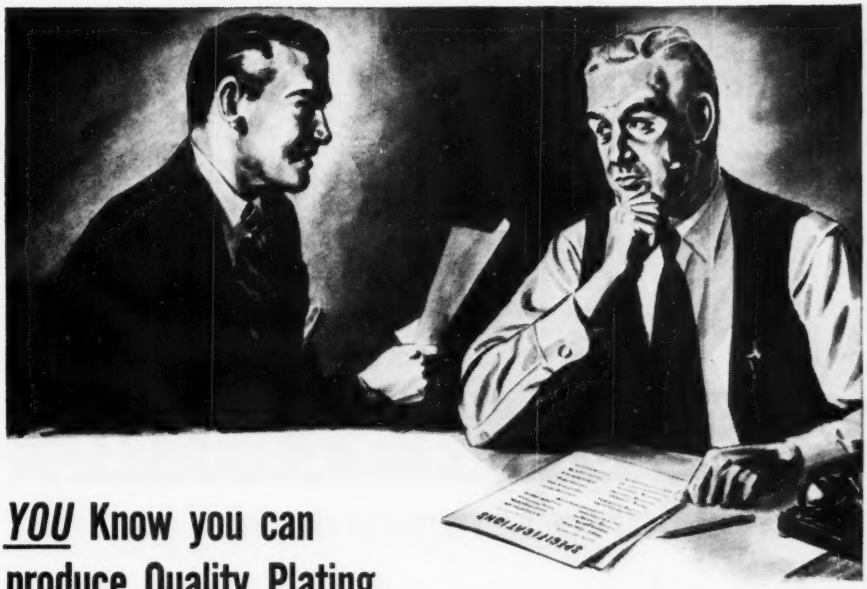

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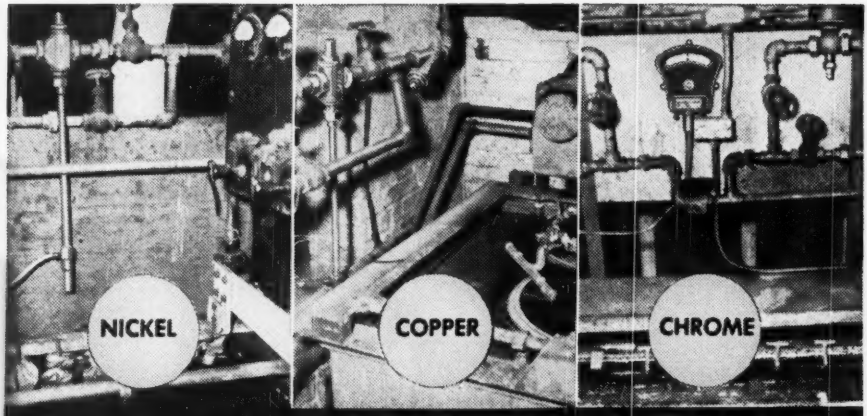

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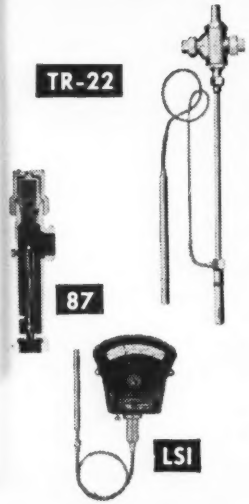
With 3 Sarco Temperature Controls



Any plating engineer knows exactly what he wants in temperatures for the various jobs going through his plant. Few realize that the very controls he needs are waiting for him and can be installed quickly at comparatively little cost.

Starting with the wash tanks he can get a suitable control in the Sarco 87 Thermoton for the cost of a good steam trap.

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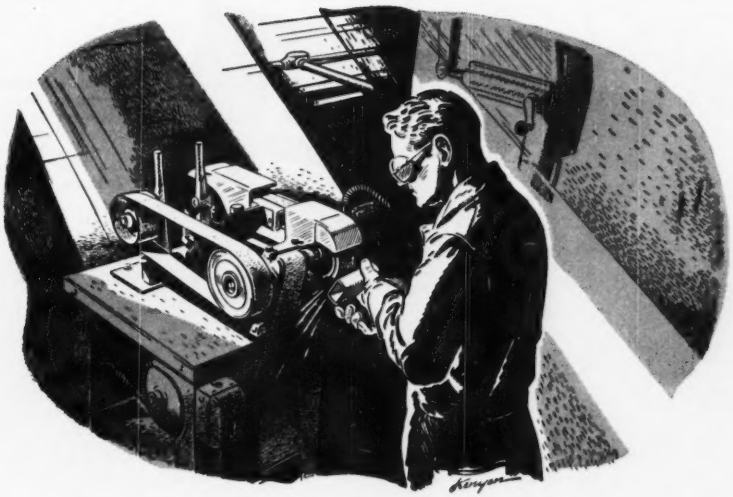

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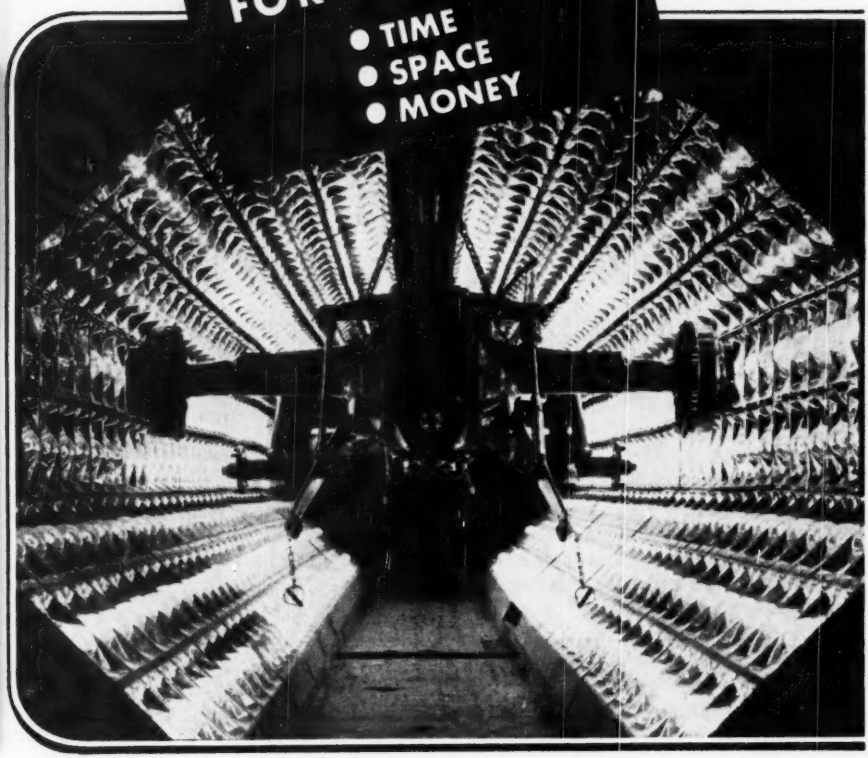

EVENRAY INSTALLATION AIDS STREAMLINED PRODUCTION. Harry Ferguson, Inc., Detroit, utilizes a 64-foot Fostoria Evenray paint baking oven with a capacity of 250 assemblies in eight hours—to keep pace with the new assembly plant's production basis of a completed farm tractor every 115 seconds.

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PRODUCTS FINISHING

Repairing and Silver Plating Valuable Antiques

In the shop of John H. Feeley, Montreal, Canada, silver plated articles are restored to their original beauty and usefulness by a combination of mechanical and electroplating methods. Mr. Feeley, an electroplater of 60 years' experience, 14th president and honorary member of the American Electroplaters' Society, offers by means of this article fundamental, practical information regarding silver plating.

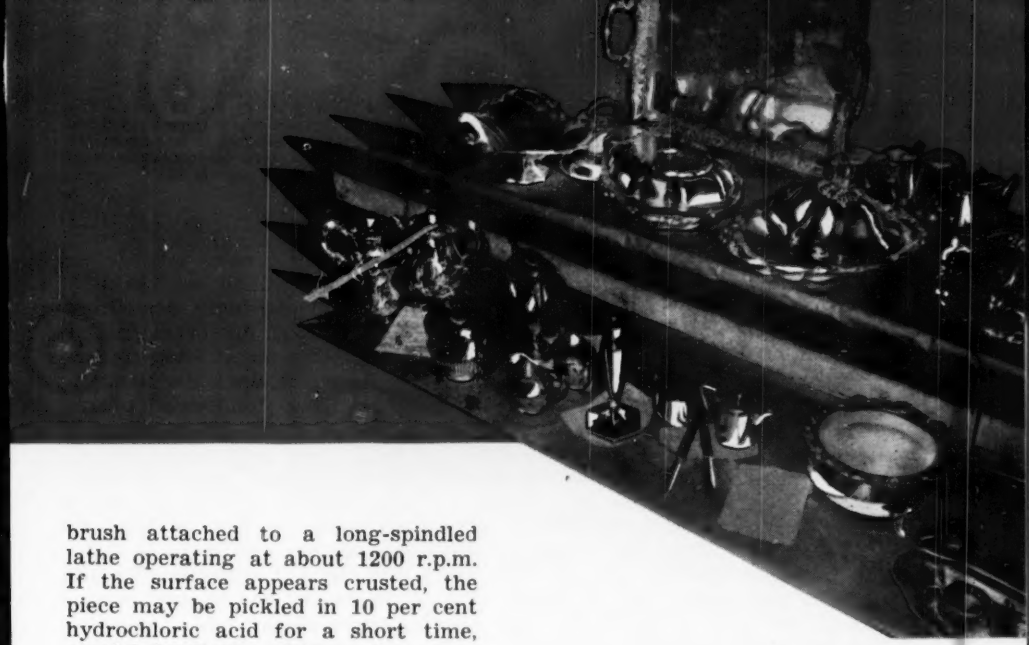
By EZRA A. BLOUNT

PF FEATURE

Silver plated articles, some of which date back to the early 1800's, are brought for repairing and refinishing only to the expert silversmith. Base metals which the silver shop must be equipped to process include Britannia Metal (90 per cent tin, hardened with antimony and less than 3 per cent copper), German silver or nickel silver (which is a copper-nickel alloy containing 10 to 18 per cent nickel; as a rule, the alloy used for flatware averages 18 per cent nickel), pewter (85 per cent tin, 15 per cent lead approximately), brass, and copper.

Stripping Old Plate

Silver plated ware must first be stripped to the base metal to ensure a sound plate and eliminate any possibility of the silver plate ever peeling. Nickel silver, German silver, brass, copper, and in some cases, Britannia Metal, may be stripped in a nitric-sulfuric acid mixture containing 9 parts sulfuric and 1 part nitric acid. Pewter and Britannia Metal may be stripped in a solution of 10 oz./gal. sodium cyanide, using reverse current and lead cathodes. As the stripping proceeds, the article may be rinsed and scratch brushed on a German silver



brush attached to a long-spindled lathe operating at about 1200 r.p.m. If the surface appears crusted, the piece may be pickled in 10 per cent hydrochloric acid for a short time, scratch brushed, and if necessary, re-pickled and re-brushed until the base metal is clear. The proper technique is to remove the old plate carefully without etching or damaging the base metal surface. After products are completely stripped, they are scratch brushed over the entire surface, using a number of different brushes as necessary. These brushes can be made by the silver plater from German silver wire sections mounted in a double-threaded arbor which is attached to the lathe spindle. Any number of sizes and shapes of scratch brushes may thus be assembled. A final light sand-blast is required on some surfaces if such a finish has been specified by the customer.

Mechanical Repairing

Dents and marks of mechanical damage of all kinds are removed by hand rubbing or raising and hammering, using a number of special steel anvils and hammers (see Figures 1 and 2). For some kinds of damage a small sheepskin bag filled with sand is used as the anvil. This operation requires consider-

Fig. 1—Repairman employs specially shaped anvil and hammer to remove dents and re-shape article to correct surface contour.

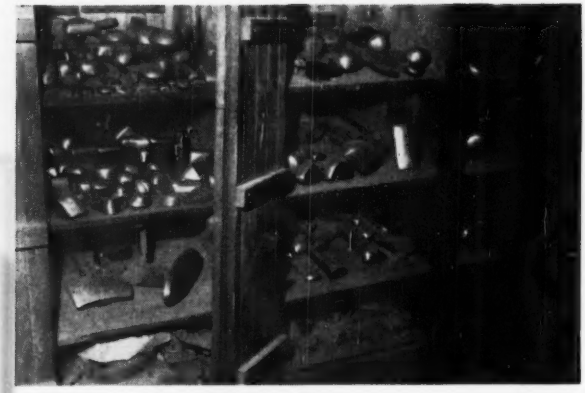


Fig. 2—A view of some of the anvils which have been made and stocked to make possible dent removal from surfaces of every kind

able skill on the part of the repairman so that the exact shape and contour of the damaged area is restored. In some cases new parts must be made; hinges can be made by hand, and the shop is equipped with a wire drawing machine and dies through which hinge pin wire of any diameter or material can be drawn. Plastic insulators and minor items are turned on a lathe. If parts must be formed by metal spinning, that too is accomplished on a lathe using special spinning tools.

Soldering

Silver solder or soft solder is used to attach knife handles to blades, repair all types of defects, strengthen weak seams (silver solder only), fill holes, and so on (see Fig. 3). A number of silver solders composed of varying parts of silver, brass, zinc, copper, or tin are employed, the selection of each being determined by its melting point. In all cases, a solder with a melting point just below that of the metal being repaired is used. For succeeding soldering operations a still lower melting point solder is employed. Some examples of solders may be cited: pure tin can be used on Britannia Metal; a mixture of 2 tin and 1 lead melts at approximately 100 deg. F. lower and can be used in succeeding operations.

In soft soldering Britannia Metal, brass, or nickel silver, a flux of 9 parts glycerine and 1 part C.P. hydrochloric acid is used; for silver soldering hard metal, borax is the fluxing agent employed. The article is heated with a torch fed by regular city gas and compressed air and fluxed. The silver solder is not applied until the flux starts to run, and in this way a perfect joint

Fig. 3—Silver soldering is used to repair a damaged article and attach new parts needed to return the piece to its original condition.

Fig. 5 — Tampico brushing a candlestick with wet pumice prior to silver plating. Some of the German silver wire brushes used for scratch brushing may be seen in the foreground. Long-spindled lathes are essential so that work can be turned or positioned in all directions, without interference from the lathe body.

is made. The adjacent area of the piece should be pre-heated before soldering to preserve the shape of the piece.

Sand and Tripoli Buffing

Deep scratches are removed by sand buffing on specially-shaped walrus hide wheels mounted on a long-spindled lathe operated at approximately 2,000 r.p.m. Damp pumice is used as the abrasive, the exact grade varying with the depth of scratch. Generally 0/2 pumice will serve satisfactorily. The pumice must be held in one hand and fed into the wheel just ahead of the surface being polished, or held in the object being polished and fed as the buffing proceeds. Figure 4 shows a buffer using the latter method. Fire scale may be removed from sterling silver with a tampico brush dusted with pumice.

This operation is followed by a tripoli buffing operation performed in the usual manner on 6 or 8-inch diameter stitched buffs rotating at approximately 2,200 r.p.m. Buff size, shape, and shaft speed depend upon the item being processed.

Fig. 4—The sand buffer scoops damp pumice into the tray so that it will feed under the walrus hide wheel during the buffing process.

Silver Plating

Buffed products are prepared for plating by soaking in an alkaline

Fig. 6—John H. Feeley hangs a load of work in one of the silver plating tanks. Only very simple wiring or racking is required for this plating operation.

cleaning solution operated at about 180 deg. F. Hand brushing with cleaning solution, and rinsing follow. Articles are then scratch brushed (German silver wire) on a brush lubricated with warm water and bran to be sure that all contamination is removed from the background areas. A final cleaning operation consists of brushing either by hand or on a lathe-

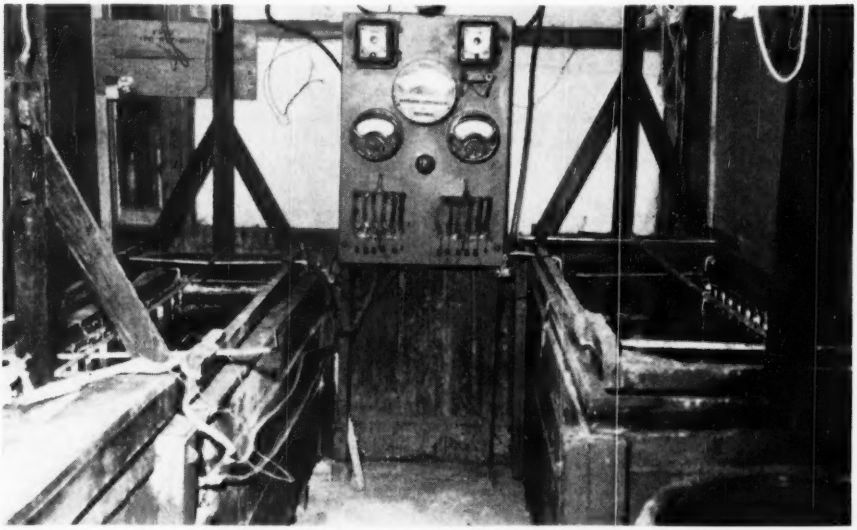
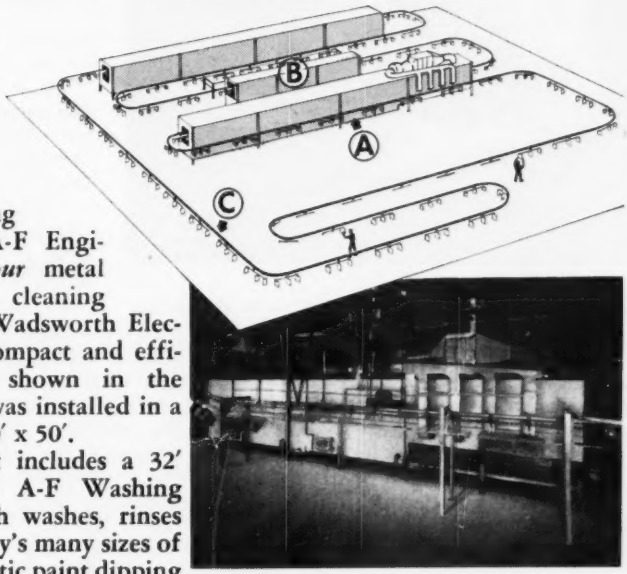


Fig. 7—An overall view of the silver plating setup, showing tanks, panel board, ammeters, voltmeter, and ampere-hour meters. The wooden inverted Y frames which support the cathode rods are part of an ingenious mechanism used to provide gentle agitation of the work during silver plating.

150% INCREASE

in production made possible

by ALVEY-FERGUSON *"Cleaning Package"*



Here's an outstanding example of how A-F Engineers can solve *your* metal parts and products cleaning problems. At The Wadsworth Electric Co., Inc., the compact and efficient arrangement shown in the schematic drawing was installed in a floor area of only 50′ x 50′.

This arrangement includes a 32′ especially designed A-F Washing Machine ***(A)***, which washes, rinses and drys the company's many sizes of products; the automatic paint dipping unit ***(B)*** and the 384′ A-F Engineered Overhead Trolley Conveyor System ***(C)***, which combines all of the operations into an "endless stream" production. This new A-F "cleaning package" reduced the complete finishing cycle from 1 hour and 40 minutes to 40 minutes; and by *thorough* cleaning, greatly improved the quality of the products.

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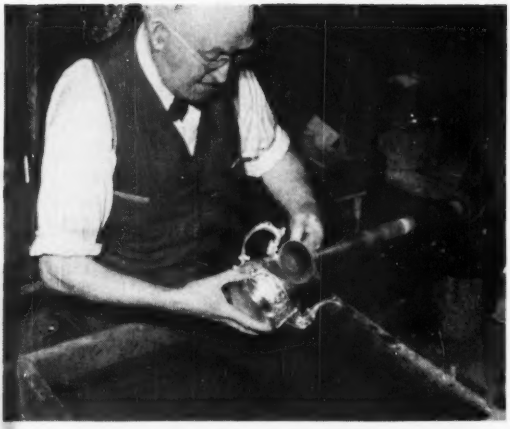

Fig. 8—Silver plated articles are scratch brushed on a German silver wire brush as a preliminary operation to the hand burnishing and/or rouge buffing process.

driven tampico brush using a pumice slurry as the cleaning agent, as illustrated in Fig. 5.

The cleaned article (wired or racked for plating) is next water rinsed, dipped in 10 per cent hydrochloric acid, water rinsed, dipped in a 10 oz./gal. sodium cyanide solution, water rinsed, and given a 2 to 60-second strike at 6 volts in a silver strike solution composed of 0.25 oz./gal. metallic silver and 10 oz./gal. free sodium cyanide. This solution is operated at room temperature (normally 60 to 90 deg. F.) in an 80-gallon tank using stainless steel anodes. Special anodes are sometimes used to ensure the deposition of silver on interior surfaces of parts. (Note: lead-antimony alloys are given a nickel strike before the silver strike is applied.)

Following the silver strike, the pieces being processed are placed in one of the two silver plating tanks (see Fig. 6), one of 130-gallon and one of 180-gallon capacity, and silver plated for 5 or 10 minutes at 3 amp./sq. ft. Both silver plating tanks and the silver strike tank are wood, lined with lead over which has been applied a coating of asphalt. Figure 7 is a view of the silver plating setup. After the 5 to 10-minute silver plate, the ware is removed, rinsed, and scratch brushed hard using bran water as a lubricant. This operation is performed to be sure that perfect adhesion has been obtained.

Articles are next rinsed, cyanide dipped, and returned to the silver bath

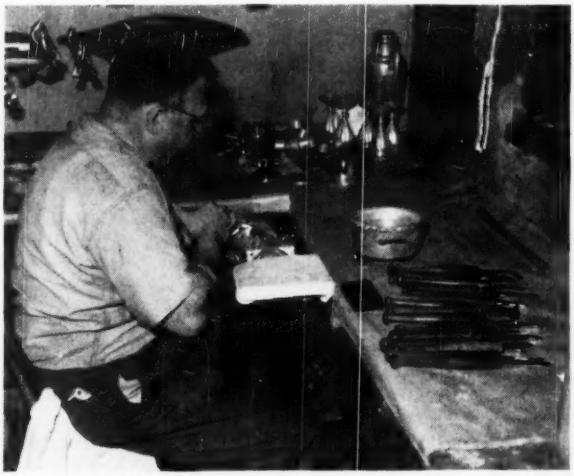

Fig. 9—William Feeley, manager of the silver department, demonstrates the hand burnishing operation on a plated teapot. Note the specially shaped burnishing tools in the right foreground.

It pays...

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because he's selling the finish that's RIGHT for your product in color, protection, durability.

We quote from the letter of an on-the-ball purchasing agent to one of our salesmen:

"We needed a lacquer with these 4 guaranteed qualities:

1-lasting adhesion to difficult and ordinary metals
2-blush-proof
3-resistance to spotting-out conditions
4-perspiration resistance

We tried your clear metal lacquer #1185 and thinner #100A. The results? An increase in orders indicates that the saleability of our products was definitely improved by the use of this finish."

Let Randolph Supply the Exact Finish . . .

There is no finishing problem too difficult for our staff of expert technicians. Their advice is yours for the asking—cost-free. Try our consultation service—it's the easiest way out of that dilemma.

Randolph

PRODUCTS COMPANY

Carlstadt, New Jersey

DOPES • LACQUERS • ENAMELS • THINNERS

Fig. 10—Rouge buffing the blade of a table knife

to receive the amount of silver required. An ampere-hour meter in each tank circuit is set so that a deposit of silver 0.001 inch thick is obtained. Plating in the silver bath proper is sufficient for most cases, but for additional thickness on interior surfaces, some pieces (after the regular silver plating) are filled with silver solution and plated with a special anode to secure additional thickness on the inside.

The silver plating solution is formulated and operated as follows:

Silver ---------- 3.5 oz./gal.
Free sodium cyanide---- 3.0 oz./gal.
Sodium carbonate ------ 4-5 oz./gal.
Temperature ---------- 60-90 deg. F.
Current density ---- 3-5 amp./sq. ft.
Silver anode area held equal to cathode area (unbleached muslin bags are used on silver anodes).
Agitation — very gentle — mechanical—approximately 30 three-inch oscillations per minute.

Silver plated ware is rinsed in a concentration or make-up rinse, followed by a cold water rinse, and then scratch brushed with German silver wire brushes and bran on a long-spindled 1,100 r.p.m lathe, as illustrated in Fig. 8, to partially close the grain of the silver and change the white crystalline surface into a dull gray.

Hand Burnishing

The highest quality (and most expensive) finish for silver plated ware is secured through hand burnishing over the entire surface. A high quality (though less expensive) finish can be secured by rouge buffing the silver plate after sharp corners, crevices, and other "danger areas" have been finished by hand burnishing. Hand burnishing is performed with the aid of a number of specially shaped case-hardened steel tools, fitted with wooden handles The burnisher uses a pressure pad on his chest and, exerting a steady pressure against the silver surface, slowly rubs the silver surface, transforming the crystals into a smooth, bright coat and closing the pores. Figure 9 illustrates this process. In this operation, silver is not removed as it is in buffing. Burnishing tools are lubricated with a solution of yellow laundry soap and water.

Buffing, Lacquering, and Final Finishing

Silver articles not hand burnished all over are rouge or lime-buffed on loose buffs whose size depends upon the articles being buffed (see Fig. 10). In all cases a buffing speed of 6,000 surface ft./min. is desirable. For a Butler finish a tampico brush with pumice is used. To duplicate the finish of a Sheffield antique, a fine German silver wire brush is used.

Articles for food service are not lacquered, but trophies and similar

any way you look at it...

Stevens

MITCHELL VARIABLE SPEED POLISHING LATHE

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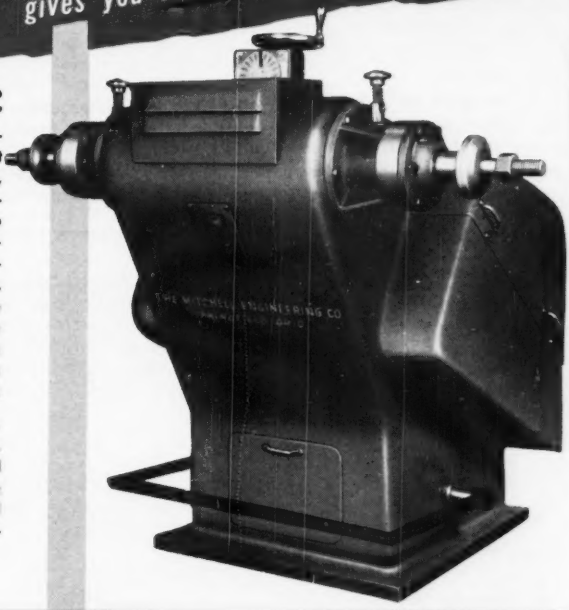

From its *instant-safety* foot brake to its unique split spindle, Stevens' new Mitchell Variable Speed Polishing Lathe is designed and built for many years of dependable, trouble-free service. Finger-tip variable speed control (from 1500 to 3000 r.p.m.) permits a work variation *from cut and color to satin finishing with no lost motion or delay.* Wheel and buff inventories can be minimized since the same variable control of peripheral speeds makes it possible to get the maximum use out of every inch of wheel or buff.

Models No. 3-VSD with 3 H.P. motor and No. 5-VSD with 5 H.P. motor will take up to 4" faced wheels. No. 7½-VSD with 7½ H.P. motor handles up to 6" faced wheels. *Write for descriptive literature and prices*

NO OTHER LATHE HAS THESE COMBINED CONSTRUCTION FEATURES

VARIABLE SPINDLE SPEED CONTROL permits wide work variation, maximum wheel and buff use.

ALL-WELDED BASE of ¾" steel plate provides greater strength.

"ROTO-CONE" VARIABLE SPEED PULLEY assures perfect belt alignment and uniform wear.

2-SECTION SPLIT SPINDLE design permits fast convenient belt replacement.

4-BEARING SHAFT SUSPENSION insures perfect spindle alignment.

INSTANT-SAFETY ACTION FOOT BRAKE cuts out motor and instantly "brakes" spindle rotation.

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METAL FINISHING EQUIPMENT AND SUPPLIES DIVISION

FREDERIC B. STEVENS OF CANADA, LTD. WINDSOR, TORONTO, ONTARIO

products may be so coated. Such parts are cleaned with a dry, clean buffing wheel so that absolutely no buffing compound remains on the surface. Great care must be taken in buffing the articles so that a clean surface and perfect lacquer adhesion are obtained. Articles are then sprayed with a coat of clear lacquer and dried, first in room temperature air, and finally in an oven held at about 150 deg. F. (Note: in service, lacquered parts will stand up longer if never handled with bare hands.)

Many and varied are the high-quality silver plated articles leaving the shipping department each day. On the subject of plate quality, Mr. Feeley advises his customers, "If you are so fortunate as to live long enough to wear out this article in normal service, just return it, and there will be a Feeley here who will replate it for you free of charge."

The first can enamels to be used consisted of the so-called "sanitary enamels" developed at the beginning of the present century for protecting certain acid foods.

Porcelain enameled conveyor slats have been found to give excellent service where corrosive and high-heat conditions are encountered. The porcelain enameled slats are also easy to keep clean.

NEW PACKAGE FOR ABBOTT BALLS—The Abbott Ball Co., Hartford, Conn., announces a completely new package for its complete line of bearing balls. The new package is a sealed canister of 32 gauge steel with tin plated ends, measuring 6¾ x 3½ x 3½. It will accommodate 105,000 balls 3/32" in size, and 340 balls ⅝" in size, the largest size packed. The canister is lacquered inside for added protection. Exhaustive pretests prove the can will withstand abnormally hard use. The black plate body is lithographed in a rich blue on a white background, with the Abbott trademark and slogan "the all round ball" as the predominant theme. A special panel is provided for hand stamping of size, quantity, grade and ball tolerance. The use of these metal containers has reduced shipping weight substantially, according to Abbott officials. Canisters are packed in a newly developed, reinforced cardboard carton for both domestic and foreign shipment eliminating heavy wooden cases, facilitating handling and storage.

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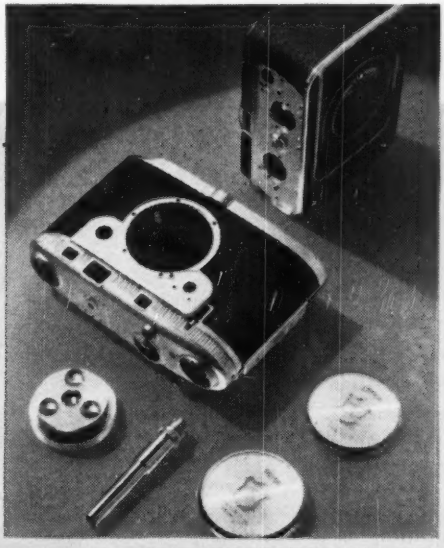

Camera parts courtesy of Bell & Howell

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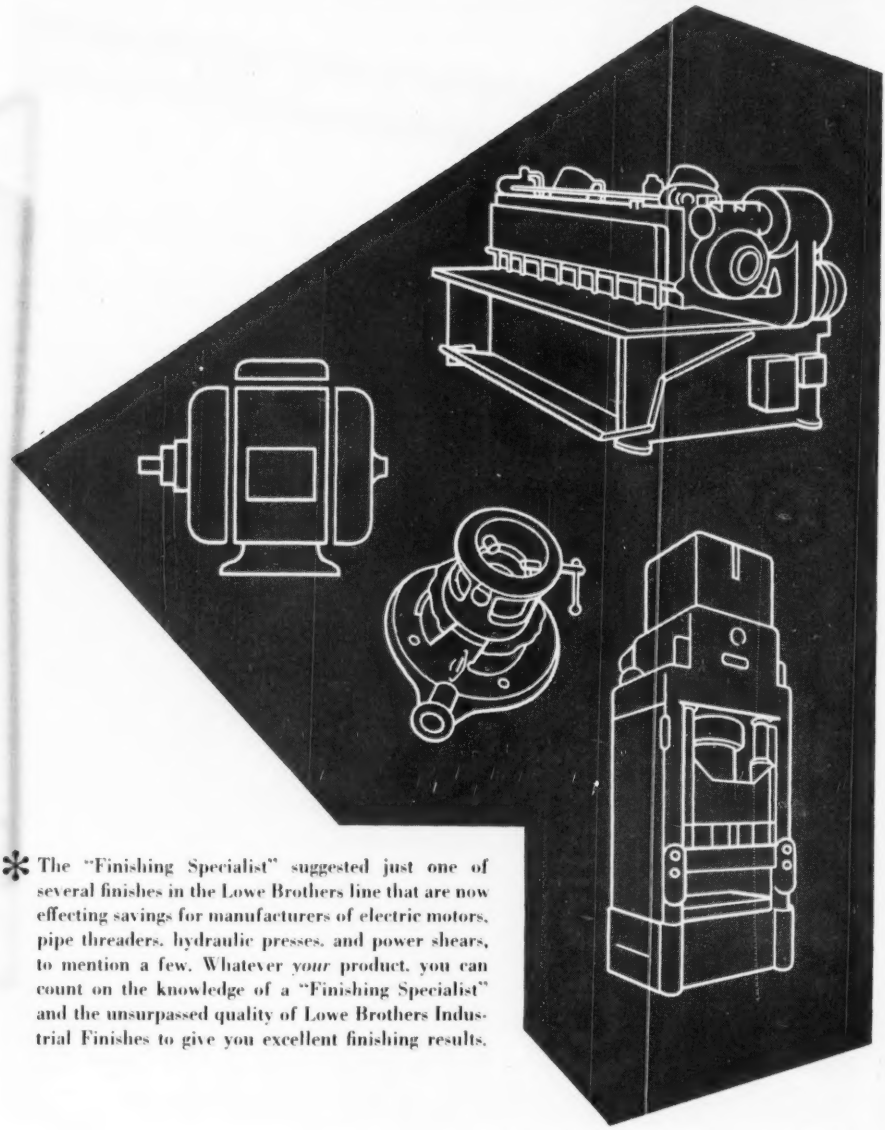

✻ The "Finishing Specialist" suggested just one of several finishes in the Lowe Brothers line that are now effecting savings for manufacturers of electric motors, pipe threaders, hydraulic presses, and power shears, to mention a few. Whatever *your* product, you can count on the knowledge of a "Finishing Specialist" and the unsurpassed quality of Lowe Brothers Industrial Finishes to give you excellent finishing results.

This advertisement is based on facts from the Lowe Brothers

"FINISHING SPECIALIST"

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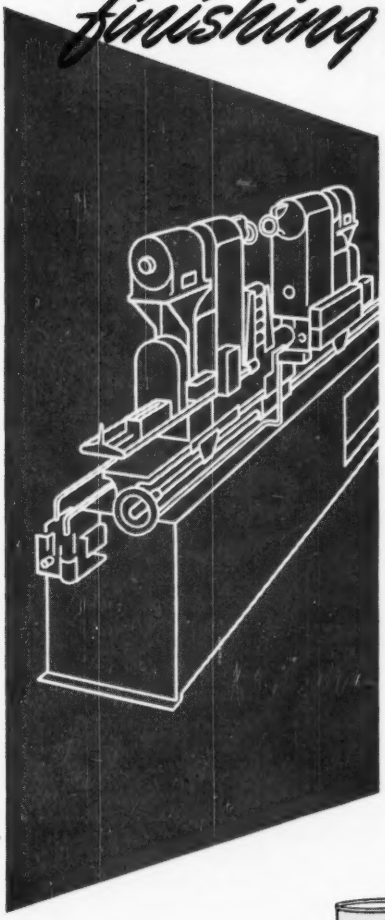

A large machinery manufacturer was applying a deluxe finish to all of his metal products —even to those which did not require the finest type of finish. Through his thorough knowledge of finishing requirements, a Lowe Brothers "Finishing Specialist" was able to recommend a less expensive finish* and preparation method for equipment being sold to less exacting customers. Net result: The finished products were just as salesworthy as before—but *finishing costs were 50% lower!* What's more, further savings were effected because the need for a large part of the costly filling and sanding operations was greatly reduced!

A simple solution, yes, but a typical result of the experience and knowledge which a Lowe Brothers "Finishing Specialist" brings to any job. Why not have your finishing operations checked *now* and take advantage of the benefits of better methods and materials? There's no cost or obligation. Write today for details on this service.

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Industrial Case History Files.

The Hot Spray Process

By JAMES A. BEDE
President, Bede Products Inc.

ONE of the most important advancements in the finishing field in recent years has been the successful development of the hot spraying process, which bids fair to become a common practice throughout the industry. The process is designed to use heat as a viscosity-reducing agent, in effect substituting heat for thinners. It will make possible, for the first time, constant spraying at a uniformly ideal temperature. In those places where it has been properly put into practice, the results produced clearly indicate the potential benefits of the process. Labor and material savings can be achieved; and at the same time, the quality of the finish can be conspicuously improved.

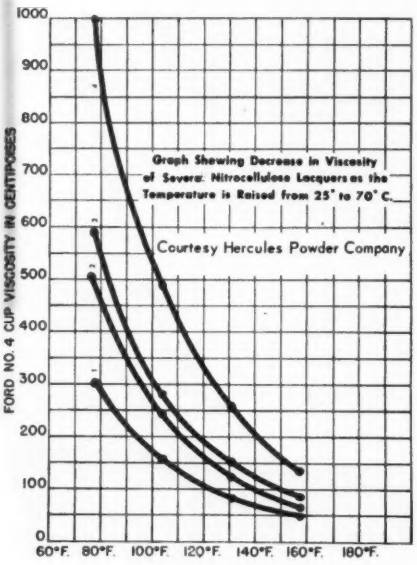
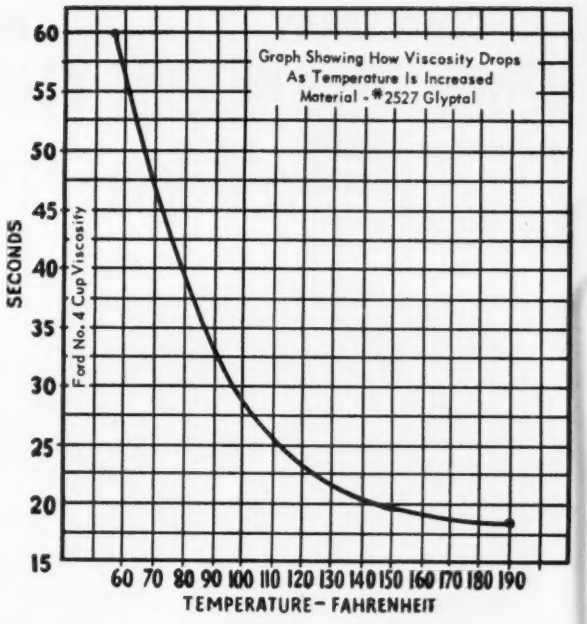


Figure 1

It is true that a few years before the war hot lacquers were talked about by many, tried by a few, and generally discarded. Most of these tests were prematurely conducted, with insufficient technical developments to back them up. In certain countries of Europe, however, hot spraying has been very successfully developed. In Sweden, for example, 90 per cent of all lacquers are now sprayed hot. Although the theoretical value of the process has long been recognized in this country, its general acceptance and adoption has been delayed because there was no practical, trouble-free and economically-priced device to accomplish heating. Also, paint manufacturers found that it was not always a simple matter to adjust every formula for hot spray. These obstacles have now been overcome. Coincidental with recent improvements in paint heaters, very important progress has been made by paint manufacturers in perfecting hot spray formulations. The chain is now complete so that any paint user who wishes to avail himself of this new, advanced process can

Figure 2



undertake to do so with reasonable assurance of success, if he will follow the correct procedure. It will be the effort of this article to point out the factors involved and the steps necessary to obtain success.

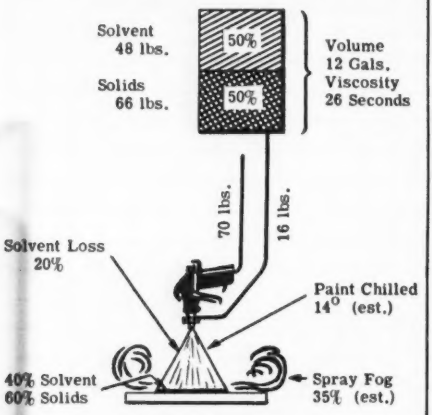
Why Hot Spray Is Desirable

In most cases with the hot spray process paints are heated to a fairly high temperature (between 160 and 200 deg. F.) just before spraying. By substituting heat for thinners, many benefits can be achieved. Labor and materials can be saved, production increased, and a higher quality of finish can be reached. It is a well-known fact that temperature plays an important part in the application characteristics of any organic finish. We have all heard the expression "slow as molasses in January". Paints can be said to be in the same family, chemically speaking, as molasses, and have as poor performance in cold weather. Every finisher has experienced the difference in spraying in winter (at 60 deg. F.) and in summer (at 90 deg. F.). If 30 degrees makes so much difference, how much greater benefits would be obtained if we increased the paint temperature still another 100 degrees? Thus we see that the maximum objective in hot spraying is not simply to level off daily and seasonal temperature fluctuations, but to obtain thermal control at a much higher temperature than prevails on the hottest summer day, thereby obtaining the maximum benefits from heat. Until now, the skilled finisher attempted in his own way to compensate for the daily and seasonal temperature fluctuations as he encountered them. Not always was he successful, and at best the results were a compromise. Now, however, the variations caused by fluctuating temperatures can be completely eliminated, and the optimum paint temperature uniformly maintained irrespective of weather conditions.

Action Taking Place in Hot Spray

By heating paint to 160 deg. F., the viscosity is generally reduced to ⅓ or ¼ of the viscosity at 70 deg. F. There is of course a natural limit to this thermal action. When the viscosity reaches approximately 12 to 13 seconds, very little further drop is encountered. The saturation point of the

COLD SPRAY



1. Total trigger time required to spray all the material (material flow at 12 g.p.h.):

60 minutes

2. Total volume of air used in atomization:

(70 lb. at 20.2 c.f.m. times 60 minutes)
6,981 cubic feet of free air

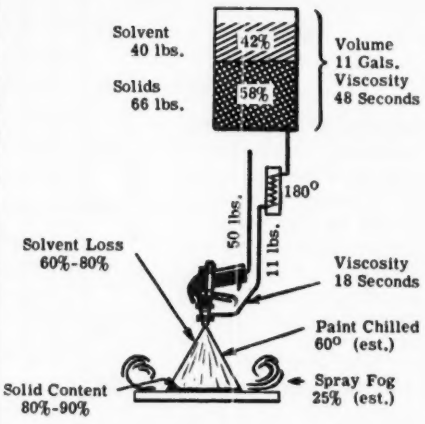
3. Film thickness required to cause sag in a vertical position:

1.2 mils

Explanation:

To ten gallons of typical synthetic enamel, two gallons of solvent are added (20 per cent reduction), raising the total solvent content to 50 per cent by volume and lowering the viscosity to 26 seconds. Fluid pressure of 16 pounds gives the correct rate of material flow (12 gallons per hour) for efficient gun stroking. The paint as it leaves the gun requires 70 pounds of air for good atomization.

HOT SPRAY



1. Total trigger time required to spray all the material (material flow at 12 g.p.h.):

54 minutes

2. Total volume of air used in atomization:

(50 lb. at 15.5 c.f.m. times 54 minutes)
3,682 cubic feet of free air

3. Film thickness required to cause sag in a vertical position:

2.6 mils

Explanation:

Instead of two gallons, only one gallon of solvent is added to ten gallons of synthetic, making the solvent content 42 per cent by volume, and lowering the viscosity to 48 seconds. Heating to 180 deg. F. reduces the viscosity to 18 seconds. A fluid pressure of 11 pounds produces a rate of flow of 12 gallons per hour. The paint requres only 50 pounds of air for atomization.

---

thermoplastic action is generally reached at approximately 160 deg. F. for synthetics but a little higher than that for lacquers. Figures 1 and 2 are typical temperature-viscosity curves for both lacquers and synthetics.

Another important key factor to consider is the much greater loss of solvent in the process of atomization. A typical example of what takes place in hot spray in contrast to cold spray is indicated in the accompanying chart. The figures given form a typical illustration to show what action takes place, and do not necessarily apply to all types of finishes.

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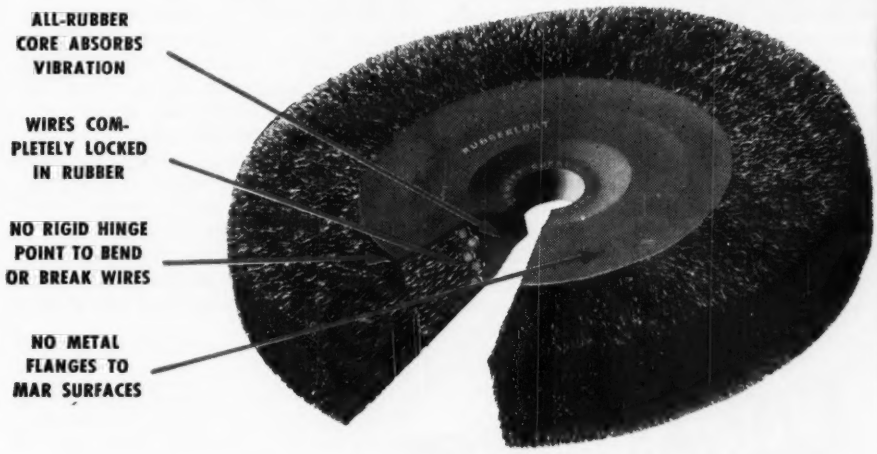
ALL-RUBBER CORE ABSORBS VIBRATION
WIRES COMPLETELY LOCKED IN RUBBER
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NO METAL FLANGES TO MAR SURFACES
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For many reasons, you'll say the HEWITT **RUBBERLOKT** ROTARY WIRE BRUSH is a better brush in every way!

More Brushing Points—Exclusive Hewitt rubber flange keeps bristles upright . . . provides more brushing points . . . gives you a smoother job.

Better Flare Control—Special rubber flange won't let wires bend or mat down. *Gives brush longer usable life!*

Faster, Better Work—Hewitt flexible rubber-locked mounting holds wires together compactly under pressure. Lets your workers do a faster, better job . . . even on irregular surfaces.

For more details about the new Hewitt **RUBBERLOKT** Rotary Wire Brush, write Hewitt Rubber Division, Dept. PF-12, 240 Kensington Avenue, Buffalo 5, N. Y.

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Rotary Wire Brush

Hewitt Rubber Division **HEWITT-ROBINS INCORPORATED**

The relationship of solid content, viscosity, solvent loss in atomization, and so on, will vary with the different finishes, but the ratio of variation and performance between cold and hot spray is virtually the same for all types of organic finishes.

Solvent Loss

In the process of atomization, a certain amount of solvent is released from the finish. This amount varies depending upon temperature, evaporation rate of the solvent, and the distance the gun is held from the surface. But it generally averages between 16 and 20 per cent for room temperature spraying. Therefore the coat of finish deposited on the surface has a greater proportion of solids, and a lower solvent content than the original material.

In hot spraying the solvent loss is much greater (up to 80 per cent) because the paint comes out of the gun at almost the boiling point of the solvent. This solvent loss is very desirable, providing the remaining solvent carries the burden of proper flow. This is probably the most critical factor in hot spraying and the one point which may make a hot spray test fail. However it is this very fact that brings about so many of the benefits of hot spraying.

Paint Chilling

Evaporation of the solvents, plus expansion of the compressed air brings about a refrigeration action. Because of the high temperatures involved, the atomized particles in hot spray drop much more in temperature than the same particles in cold spray, but still reach the product surface at a higher temperature and with better flow characteristics than in cold spray. Some finishers mistakenly anticipate that the paint will strike the surface in a very warm state, and are disap-

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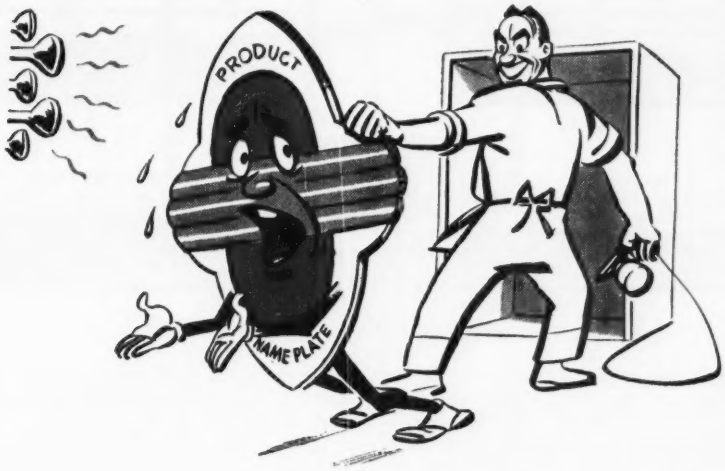
"WHAT! Do I have to go through this again?"



No wonder finishes discolor so often—there are so many factors which can contribute to such a condition. Overbaking, for one.

This was the case with a nameplate manufacturer. In the multicolor enameling of his product, the first coat had to take the bake of a second application, and even that of a *third*. He got plenty of discoloration – plenty of rejects.

Taking on this problem, enterprising Unichrome engineers came up with a special formulation designed to fit *all* the production requirements – and a difficult set of specifications they were indeed. It ended the rejects alright – but what's more, *it cut 25% off former finishing costs!*

Want a fresh slant on *your* problem? Write us.

Remember – a "fresh viewpoint" often works wonders!

UNICHROME

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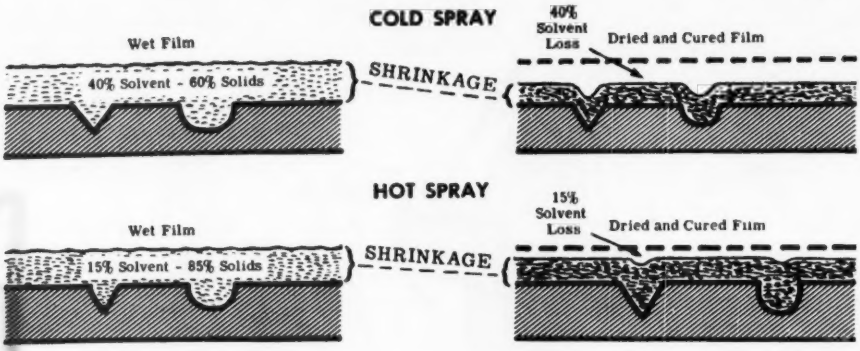


Fig. 3—Coverage of surface imperfections

pointed in the hot spray process when they find out that this is not so. It is important to bear in mind that the atomization takes place within one inch of the tip of the spray gun where the opposing air streams from the cap converge. The rest of the fan action simply spreads the atomized particles to the desired pattern for easy spreading of the paint on the surface. The subsequent paint chilling can be ignored.

How Hot Spray Can Bring Specific Benefits

Temperature plays an important part in the spraying properties of every finish, and there is some one ideal spraying temperature. At this ideal temperature atomization is most easily accomplished, and the paint particles flow out most smoothly.

With the correct, efficient use of the hot spray process both the spray gun and the paint can be made to work much better than before so that a number of advantages may be gained.

From an economy standpoint savings of paint, thinner, labor, rejects, air, fuel costs for baking, heating air lost by spray booth exhaust, and overhead can be realized.

Better quality, in the form of a smoother film with less orange peel, greater gloss, and better coverage of surface imperfections, can be obtained; and no blushing of sprayed lacquer is experienced.

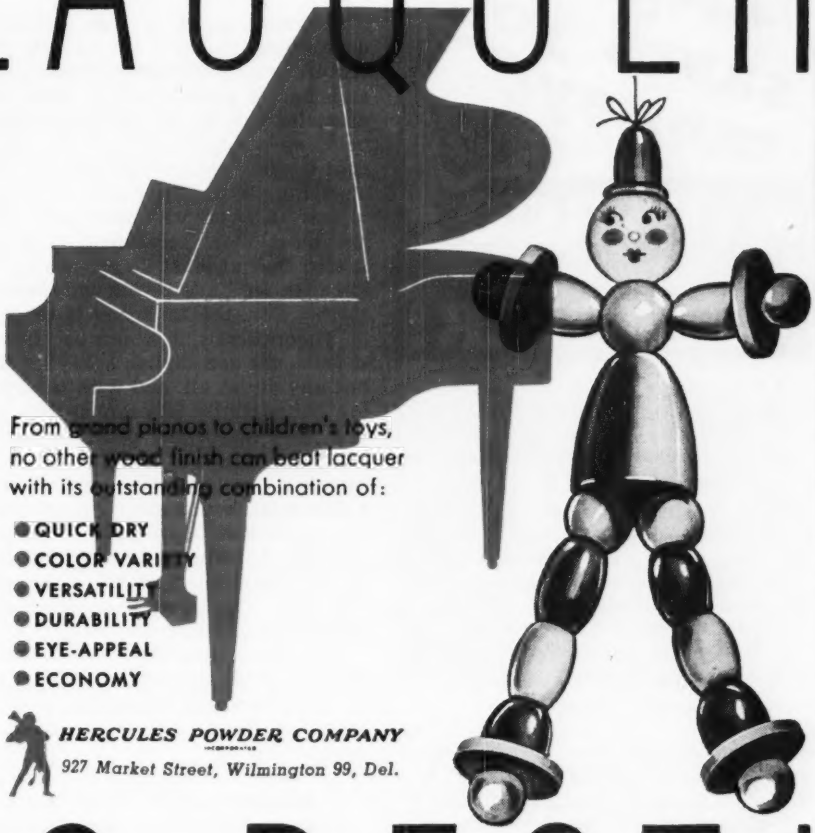
Increased production may be secured since less actual spraying time is required—one coat often performing the work of two, fewer rejects are produced, and shorter baking or drying time may be used.

The employment of the hot spray process results in better working conditions because there are fewer solvent fumes to inhale, and less spray fog to rebound into a sprayer's face.

This may seem like an imposing list, yet each and every one of these benefits can be accomplished—in some cases all of them at once. In many cases, however, the hot spray process is used to gain one or two of these specific benefits. In nearly every factory the management is seeking certain improvements in the paint department in preference to any others; for example: reduction of paint loss and rejects, or perhaps the securing of better coverage.

In spraying at room temperature, a sprayer has very little latitude in his finishing adjustments. His balance in solvent content, spraying pressures, and gun stroking are restricted within very narrow limits. He has very little

LACQUER



From grand pianos to children's toys, no other wood finish can beat lacquer with its outstanding combination of:

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Hercules does not manufacture lacquers, only the basic materials from which they are made

A Parco Cleaner costs you more per pound than your present metal cleaner. Yet cleaning economy—actual money savings—is reported from plant after plant, after changing to a Parco *Formulated* Cleaner.

Parco Cleaners are specially formulated to clean and condition metal surfaces for the next step in the finishing operation, to reduce cleaning time, operating temperatures and concentration of cleaner used. Surface area cleaned per pound of cleaner material is the basis of cost comparison of metal cleaning.

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- **Emulsion and Solvent Type**—Spray and immersion cleaners for removing oil, grease and soil from metal surfaces.
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Parker RUST PROOF COMPANY
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latitude as to how much paint can be put on the surface without sagging. But with hot spray the possibilities of variation and the corresponding range of benefits obtainable are many.

Savings

Basically, paint savings can be accomplished because the heated paint requires much less air for atomization, and hence proportionally less paint particles are blown past the surface being sprayed. Too few seem to realize that a great volume of paint is lost in spraying. Often 50 per cent of the paint is lost in overspray and even under the most ideal conditions it is estimated that at least 25 per cent is lost. Because we have reconciled ourselves to this loss, the tendency is to ignore it. Theoretically it would be "Utopia" if we could accomplish spraying without any air at all, and with hot spraying we partially accomplish this goal.

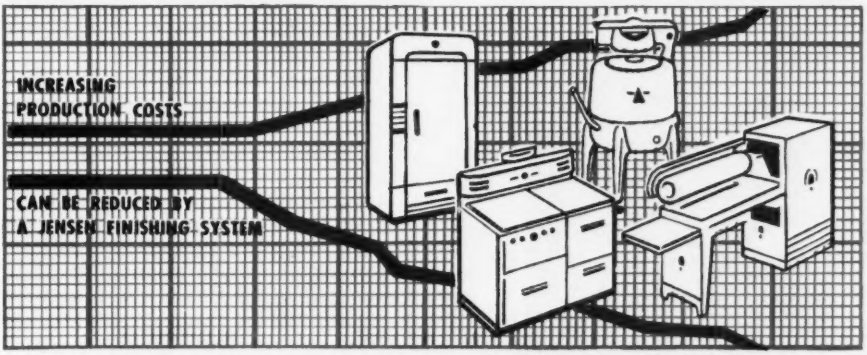
A very important point to consider in attempting to accomplish paint savings is to avoid putting on the surface a film thickness greater than normally is required. It is possible to maintain any film thickness desired (the range is much greater than for cold spray). The film thickness is controlled by correctly adjusting the viscosity.

It is important therefore to bear in mind that the amount of solvent used in hot spraying must be carefully watched. There are three groups of operations:

1. Where the object is to maintain a minimum film thickness, just enough to obtain complete coverage of surface.
2. Where the objective is to spray a moderately heavy film for pleasing eye effect.
3. Where multiple coats are applied with the objective of obtaining the thickest film and the highest quality of finish possible.

For the first class of operations, where paint savings is the primary

TODAY'S COMPETITION DEMANDS THAT YOU REVIEW YOUR FINISHING COSTS



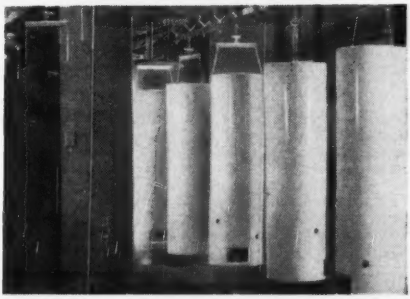
YOU MAY FIND THE WAY TO LOWER PRODUCT PRICES WITH A JENSEN FINISHING SYSTEM

Today, cost-conscious manufacturers whose operations involve low temperature baking, drying, preheating or dehydrating, are cashing-in on the money-saving advantages of infra red radiant heating *plus* coordinated conveying to be found in Jensen Finishing Systems.

Jensen Finishing Systems are *engineered for economy*—designed to increase production and minimize rejects; produce a uniform, finer, tougher finish, using less man hours, less floor space.

ABSOLUTELY WITHOUT COST OR ANY OBLIGATION TO YOU

Let us conduct laboratory tests on *your* products, using *your* finishes. Parts will be promptly returned for your inspection, together with recommendations to meet your production requirements. *You get practical proof of every possible cost saving.*



● Once considered impossible to accomplish with infra red, this Jensen "Dual Heat" *nested-lamp* oven dependably bakes a uniform white and ivory enamel finish on water heater jackets—delivers faster, better results, *plus* over-all economies. *Have you an "impossible" job that needs doing? Let's discuss it.*

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MANUFACTURERS OF *ECONOMY-ENGINEERED* RADIANT HEAT EQUIPMENT

"DUAL HEAT" INFRA RED OVENS • CONVEYORS • PAINT DIP TANKS

objective, the amount of thinner used for hot spray should be the same or very close to that which is used for cold spray. As this relatively thin material passes through the heater the viscosity is still further reduced, and atomizing air pressures can be lowered generally to ½ or ⅓ the values formerly required. It is extremely important that fluid pressures also be lowered. Otherwise too much material per second of trigger action comes out of the gun, and the tendency of the sprayer is to deposit a heavier film on the surface than is required.

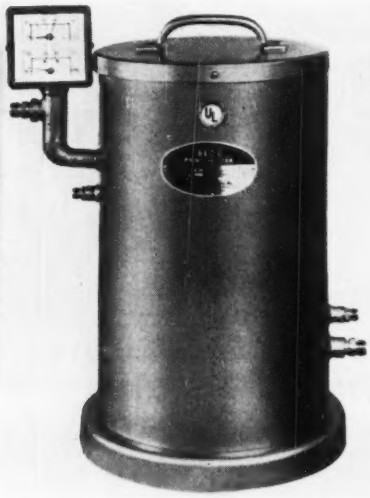


Fig. 4—Standard non-circulating heater. This Underwriters' Approved unit heats paint to temperatures up to 200 deg. F. Paint and air coils are heated by two cartridge type heaters, using aluminum as the heat transfer agent. Temperature settings can be maintained within ½ deg. F. A gage shows paint temperature and pressure as it leaves the heater.

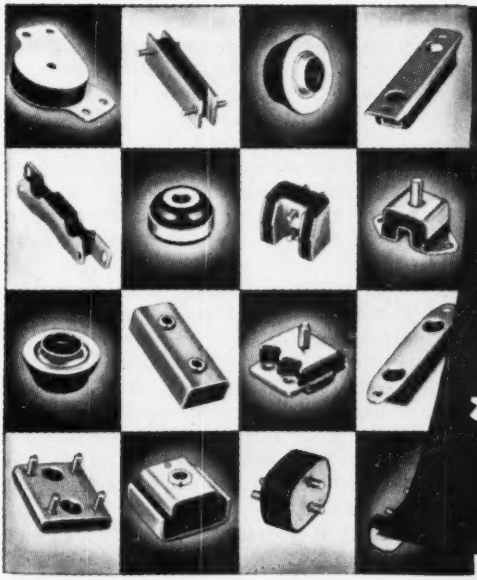
For the second group of operations it is best to start out with half the normal amount of thinner used, observe the film thickness obtained, and then further adjust the solvent content down or up to increase or decrease the amount of material deposited on the surface.

In the third case generally a two or three-coat operation can be reduced to one coat by replacing the solvents with heat as much as possible. This is especially true for lacquers.

In all cases where the hot spray process is properly used, very little spray dust is blown into the booth, but we must guard against a tendency for sprayers (especially those beginning to use the hot spray process) to offset that saving by depositing a much heavier film than formerly. It is certainly not correct to assume that hot spray necessarily means a heavier film thickness. When properly controlled, any film thickness can be obtained, and overspray reduced.

Because heat is used as a viscosity reducing agent, less thinner is generally required. The exception is, as pointed out above, where a minimum film thickness is desired—in which case nearly the same amount of thinner is used in order to safeguard the tendency of the painter to spray too heavy a film. However, where the problem is to deposit a normal full coat of one mil or more, the thinner saving is an appreciable item. The Hercules Powder Company shows in its analysis of hot spraying of lacquer that direct material costs are 13½ per cent lower.

The heated paint is so much easier to atomize that the spray gun becomes a much more efficient tool and can handle a larger volume of finish per second of trigger action. This results in fewer strokes of the spray gun. In many cases criss-crossing of strokes is eliminated, and often where a sprayer formerly required ten strokes to spray a given area he may only require six or seven strokes with the hot spray. In fact one of the difficulties in introducing hot spray is to teach the operator to take fewer and fewer strokes with the spray gun. Besides the direct sav-



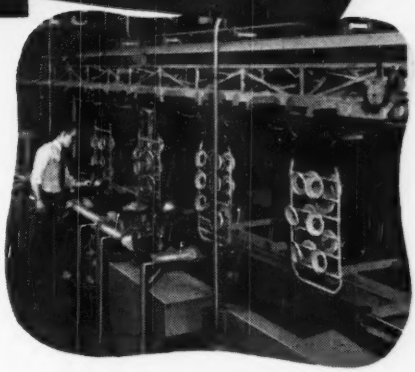
A CHECKERBOARD OF PRODUCTS PROTECTED BY *Udylite Automatic Plating*

PRODUCTION IMPROVED — — REJECTS CUT IN HALF!

In the development of the famous U. S. Rubber "Brass-O-Matic" process for a permanent bond between rubber and metal, high quality plating was of primary importance. U. S. Rubber engineers turned to Udylite with their problem, with results that have paid off handsomely. Their Ft. Wayne plant has a top notch performance record to report. They say:

1. **"Cost of materials per-unit-plated is about the same, BUT — —**
2. **"The percentage of plated parts requiring re-processing has been cut in half!**
3. **"The new layout using Udylite equipment has reduced direct labor by 27%;**
4. **"Overall floor space requirements in the Plating Department have been greatly reduced, providing necessary space for storage of plating chemicals and supplies; and . . .**
5. **"Maintenance time required to keep units in good operating condition has been reduced substantially."**

Every day, more and more shrewd production men are turning to Fully Automatic Plating Equipment—designed, installed and applied by The Udylite Corporation. Perhaps you have a plating problem in your plant! If you have, we will be glad to make recommendations entirely without cost or obligation. See your local Udylite representative or write today.



UDYLITE EQUIPMENT IN THE **U. S. RUBBER CO.,** FORT WAYNE PLANT

THE *Udylite* CORPORATION
DETROIT 11, MICHIGAN

ing in labor required for spraying, additional indirect labor is saved in fewer rejects to rework, less sanding and polishing, and so on.

Those rejects attributable to improper spraying, poor covering, and sags can be very greatly reduced. As an example, one large refrigerator manufacturer reports this class of rejects reduced to 1/10 of the number prevailing before heaters were installed. Sags especially are reduced. It is a common tendency for good sprayers to deposit a wet film which closely approaches the sagging point. In hot spray the "wet point" is reached sooner, and there is a much greater margin of safety.

As indicated on the spray chart, the amount of air required for atomization is cut nearly in half, which over a whole year becomes a very appreciable item of saving.

Very often the hot spray process can reduce the time required for baking, and therefore save on fuel costs. This is due to the fact that the curing operation cannot start until practically all the solvents are dissipated from the film. With the hot spray process the painted article reaches the oven with a much lower thinner content, and less time is required to expel the remaining solvents. This factor seems to be more noticeable with infra-red baking.

With lower atomizing air pressure, and consequent reduction in spray fog, the volume of air exhausted by the spray booth can be reduced. It is calculated that in an area like Cleveland or Chicago the cost of heating exhaust air in a large plant ranges from $60 to $75 per 1,000 cubic feet of air exhausted during the winter season. Of course a saving in heat can be achieved only if provision is made to reduce the amount of air exhausted by the spray booth.

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HEAT RESISTANT FINISH

MICO Aluminum hailed by leading manufacturers as the most heat-stable finish ever to be developed for every day commercial use.

NOW—a heat resistant finish that protects—*virtually doubles the life*—of vital parts in hundreds of products like mufflers, engines, boilers, ovens, oil and gas burners. MICO Aluminum has passed 25 different tests for thermal, chemical, and physical stability, and has thoroughly proved itself on the production line. *Investigate* MICO. *Get the facts!* Write today for your copy of the new MICO folder . . .

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ENAMELS • SYNTHETICS • LACQUERS • VARNISHES

Better Quality

No matter what type of formula, or color of finish, there is some one ideal temperature at which the paint performs the best. At this ideal temperature the paint flows out most smoothly with the least orange peel. A smoother, less porous film structure is obtained since there is less solvent to be expelled from the film. In most cases the smoothness and depth of film obtained is the most conspicuous improvement of all.

In the majority of cases, the gloss is improved proportionately to the reduction of orange peel, but we do have cases where the gloss is not improved at all. This no doubt occurs when the solvent balance in the finish is not correctly adjusted for hot spray.

It has often been observed that the ability of the finish to fill surface imperfections is in inverse ratio to the amount of solvent content in the wet film applied to the surface. Surface imperfections are revealed through the

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DeVILBISS HINTS ON FINER FINISHING

AIR SUPPLY

Spray guns like most all air operated devices perform only as efficiently and dependably as their air supply. Therefore, careful thought should be given to planning the air supply system at the start and regular inspection maintained thereafter to assure best results in the paint shop.

Selecting the right compressor is the first essential. By this is meant, the right capacity and the right type. The size of the compressor should be determined only after a careful analysis of peak load demands, and even then it is good policy to provide a reasonable reserve for possible unexpected requirements. A slightly oversized compressor is a far better choice than a unit which must constantly perform to its rated capacity for normal load. The type of compressor selected should be determined by several factors. If maximum pressure demands exceed 100 pounds, a two stage design is more efficient. Below this point single stage units are generally employed. If the air consumption is relatively continuous and at a uniform rate, an "unloader" type compressor is generally preferred. Where the demand for air is irregular, an intermittent operating type of compressor is best.

After selecting a compressor give special attention to installation. The motor should be wired by a competent electrician in accordance with the National Electrical Code. Thermal overload protection should be furnished and local voltage conditions checked. Locate the compressor in a cool place at least a foot from the wall where it will receive dry, clean air. When possible it is recommended that the intake of the compressor be piped outside the building to insure clean, cool air. Care should be taken not to place the intake where steam, smoke, dust or exhausted paint spray will be picked up. A hood installed over the intake offers protection from the weather.

In the case of numerous operations throughout a building requiring different amounts of air at various pressures, economies will be gained by a decentralized air supply system. Individual compressors serving each department minimize or eliminate pressure variances, and provide an auxiliary air supply in emergencies.

Pipe lines should always be of sufficient size to provide ample flow of air to the point of use. Air lines are seldom too large but many are found to be too small. Pipes should be as directly connected as possible. If a large number of fittings are used, length of the lines should be reduced or size of the pipe increased. All piping should slope toward a drain leg at the lowest point of the air line. Drain the lines daily in the event automatic drains are not installed. Locate all air lines away from steam pipes or heat producing areas.

Fine finishes depend upon an adequate, trouble-free supply of air. Select the size compressor best suited to your operations, install it properly, connect it to an air line of the correct size and observe the results in maximum service with minimum upkeep and operating expenses

You Know it's the Best

IN AIR COMPRESSORS!

Supplying air continuously all day long, day after day, in the volume required for spray finishing calls for a compressor of more than average stamina and endurance. Actually, the job is one of the toughest any compressor can be called upon to do.

Because DeVilbiss compressors have been designed specifically for the strenuous service of spray painting many exclusive advantages are offered. A combination of features not found elsewhere are the result of the specialized engineering that underlies every detail of these cool running, highly efficient, precision built compressors. The net result is a long lasting, sound equipment investment. Furthermore, it pays dividends by delivering more air per kilowatt-hour of electric current consumed. And just as industrial finishers have found time and time again in DeVilbiss spray equipment, this is another instance where *the economy of quality equipment* pays off.

DeVilbiss compressors were designed to do one job best . . . supplying air for finishing. Bulletin CK-101 will give you all the details on the 7½, 10 and 15 h.p., 4 cylinder "V" type models. Catalog CK covers other types ranging from 1 h.p. up to 10 h.p. capacity. Phone your local DeVilbiss Sales and Service Engineer, or write for your copy to—

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Canadian Plant: WINDSOR, ONTARIO

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means QUALITY in all four

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Exhaust Systems

Hose and Connections

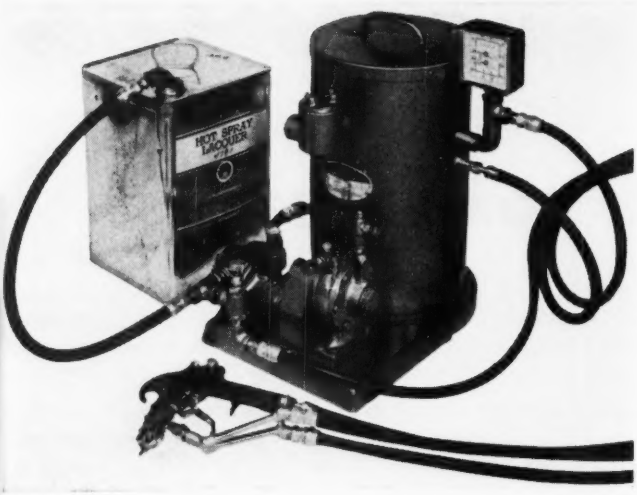

Fig. 5 — Circulating heater. Paint is heated to temperatures up to 200 deg. F. by the standard Underwriters' Approved paint heater. A fluid pump, gear-driven by an air motor, continually circulates the paint through the heater to the gun and back through the heater, thus maintaining a constant supply of hot material at the gun. No pressure tank is needed with this type of heater since the paint can be pumped directly from the container or drum. Pressure and temperature can be closely controlled, and are indicated by a gage on the line to the gun.

cured film because of the evaporation of the solvent and consequent shrinkage in the film. Because the hot spray process deposits on the surface a film with much less solvent content, shrinkage is reduced and filling properties proportionately improved.

Increased Production

Spraying time is reduced because the spray gun can handle a much greater volume of solids, requiring fewer strokes of the gun to spray a given area. By actual count, ten spraying strokes are often reduced to six or seven. This saving in spraying time becomes an increasingly greater factor as the amount of thinner is reduced. For lacquer application especially, the hot spray process is very advantageous. With hot lacquer one coat can replace two or three coats applied cold.

In many plants, the elimination of rejects by the hot spray method is astonishing. Invariably, reworking rejects is an operation which upsets production quotas, and the benefits derived from the elimination of rejects bring in themselves a series of additional benefits.

The substitution of heat for thinners enables the oven to start the curing process in a much shorter time than is the case when part of the heating zone is utilized to drive off solvents from the finish. Of course curing cannot start until practically all the solvents have been expelled. However, if the painted parts remain outside the oven for a reasonable time before entering, use of the hot spray process does not have an appreciable effect. Where the parts are air-dried, the heater brings benefits in that the paint dries dust-free in a fraction of the time formerly required. It is not correct to assume that with air-dried finishes the true curing or hardening process is speeded up. The only advantage of the hot spray process in this case is to deposit the finish with much less solvent content.

In certain areas at certain seasons of the year, lacquer sprayers experience difficulties because of blushing, a condition where moisture condenses on the freshly sprayed lacquer due to the rapid evaporation of the solvents. The usual remedy for blushing is to use expensive, slow-evaporating solvents.

Whatever it is IF IT'S MADE OF *Metal*

you'll FINISH it

• FASTER • CHEAPER • BETTER

with a Schmieg CENTRI MERGE planned FINISHING SYSTEM

FINISHING has a highly important bearing on the sale of your product if APPEARANCE is a factor in its acceptance. Obsolete, inadequate finishing equipment improperly laid out, not only makes for inefficient finishing and consequent poor appearance—it materially adds to manufacturing cost.

Equipment for metal washing, bonderizing,* dry-off, spray painting, baking, as developed by Schmieg engineers, is planned precisely for your plant and product—coordinated into a speedy, smooth-flowing production unit that saves time—space—and operating expense. Schmieg has the years of engineering experience, knowledge of modern methods and the facilities for seeing the job through—from initial designs to completed machines, set up and ready to operate in your plant.

*Trade Mark of Parker Rust Proof Co.

Our engineers will be pleased to consult with you in the solution of your problem.

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Schmieg INDUSTRIES INC.

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With the hot spray process it is virtually impossible to create a blushing condition, and it is not necessary to use expensive retarders.

Better Working Conditions

When we substitute heat for thinners, less solvent is used, and obviously less solvent fumes are thrown off by the spraying process. It is well to bear in mind that, according to health authorities, the most important caution is to prevent the toxic action caused by solvents. Although these solvents very seldom have permanent toxic properties, they can create annoying and temporarily harmful effects.

It is surprising to see how much less spray fog is generated in spraying operations when atomizing air pressures are cut in half. In most cases the need for using a spray mask is eliminated, which of course results in greater comfort to the operator. This is particularly beneficial when spraying into an enclosed compartment like a box or tool chest, or when the spraying operation is conducted outside of a spray booth.

To properly effect the above-mentioned benefits of hot spray, intelligent, careful attention must be given to many details. Finishers must undertake to achieve these benefits with an open mind and with a consciousness that they must discard many of the habits they have acquired in their years of experience in spraying. This of course is true in undertaking any new, improved process.

Types Of Paint Heaters

In the last twenty years there have been many individual attempts by paint supervisors to construct their own homemade paint heaters. Now, however, well-engineered paint heaters are available. The main classifications are those that are circulating and non-circulating. Some also have provisions

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The new Blacosolv is the most stable solvent we've ever offered for metal degreasing. Aluminum, steel, copper and precious metals may be safely and scientifically degreased with the same solvent.

Blacosolv contains a mixture of entirely new and different stabilizers. They are not alkaline materials which neutralize acid *after* breakdown. They are new stabilizers that *prevent* solvent breakdown and possible acid formation. Contains no alkaline materials that can be mistaken for stability . . . no masking agents are added.

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for partially heating the compressed air, taking the chill off in the winter time. The most desirable type of paint heater—where it can be used—is the non-circulating heater which is located very close to the spray gun. This type is desirable because there are no moving parts and therefore no maintenance headaches. The drawback, however, is that the paint cools off in the fluid hose from the heater to the gun. If the spraying is reasonably steady, the drop in temperature in the fluid hose can be easily compensated for by simply increasing the temperature in the heater to arrive at the desired temperature in the gun. However, where there is intermittent spraying, this cooling effect in the hose is so irregular that correct temperature control is not feasible. Also, in some cases, the fluid hose from the heater to the gun must be a long one—over 12 feet. In these cases it is better to use the circulating heater. With this type the paint is introduced to the heater by a pump which keeps the paint in motion between the spray gun and the heater. With the circulating heater more accurate temperature control can be maintained. Because of the critical viscosity action of lacquers at high temperatures it is also generally advisable to use circulating heaters for lacquer.

Heating of the air is beneficial for synthetic spraying when the air comes to the spray booth excessively cold in winter. However, for lacquer spraying, heated air is not only unnecessary, but is actually detrimental. These facts are from a report by the Hercules Powder Company, issued after many months of investigation of hot spraying of lacquers.

It is very important to consider safety of construction carefully in selecting a paint heater. Obviously, when paints are to be channeled through an electrical device, extra caution must be used, especially since the paint is heated. It is advisable to select only the paint heater that has been approved by some independent laboratory. It is not sufficient that simply some of the electrical wiring be enclosed in accordance with the approved explosion-proof, method, but the entire device as a whole must be completely explosion-proof, and should comply fully with the electrical code for Class 1, Group D installations. There is no danger in simply heating paint to the temperatures used for hot spraying. Some people fear spontaneous self-ignition at 200 deg. F. This fear is groundless since self ignition cannot be induced at temperatures below 500 deg. F.

Need For Cooperation With The Paint Manufacturer

Any concern wishing to adopt hot spraying should obtain the full cooperation of its paint supplier in making whatever adjustments are neces-

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On practically every type plating solution.
Here's positive, trouble-free filtration that's proof against dirt, dust, oil, sludge and all impurities usually present in plating solutions. Regardless of the size or type of your installation, there's a "Sealed-Disc" Filter to "fit your job"—write for complete details.
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Industry and fashion demand new styles—new gold finishes. That's where you will find our service invaluable. Send on your samples—we will match with speed. Golds hard as steel, that resist abrasion—corrosion proof. **GUARANTEED**

The rush is on for white finishes. Nothing compares with Rhodium—brilliant—lasting—unit cost of plating as low as gold. **GUARANTEED**

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Rhodium is a hard, white precious metal of the platinum group. It will not tarnish and will provide a brilliant white finish over most metals. Robinson distributes the internationally known Johnson-Matthey Rhodium.

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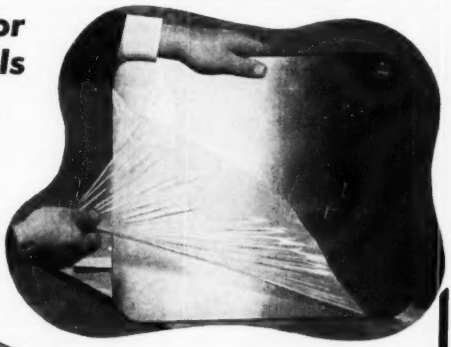
sary. Generally speaking, the adjustments required for synthetics involve the solvent addition. In the case of lacquers, it is better to have them formulated from the very beginning for hot spray. It is seldom satisfactory to take the standard material and adjust it for hot spray by juggling the solvents used. Important progress has been made recently in hot lacquer formulations which make hot spraying of lacquers a definite success. In retrospect we now realize that many of our previous attempts to accomplish hot spraying of lacquers have failed because the lacquer manufacturer did not know how to make a truly good lacquer for hot spraying. In the final analysis the paint heater is simply a device to heat paint to some given temperature. The results obtained to a great extent depend upon the formulation of the finish.

Probably the greatest benefits of all that we will derive from the hot spray process will come in the near future, as paint manufacturers become more and more experienced in hot spray formulations. This is such a new phase of operation for the vast majority of paint chemists that additional information must be acquired before we can say that the maximum benefits of hot spraying have been achieved. Most of the present attempts in hot spraying are with formulas that were designed for room-temperature applications. Every once in a while, purely by accident, we encounter a formula that produces truly marvelous benefits. After the chemists have sifted out information acquired through experience over the years, we no doubt will be able to duplicate these marvelous results consistently, so that the entire finishing industry will be able to profit from the knowledge thus acquired.

A Strippable Plastic for the Protection of Metals

Striplastic is a protective plastic applied by spraying, dipping or rolling. It is used on stainless steels, high polished metal sheets, sheets in cold working or drawing, tools, dies and parts, and on sheets or metal parts before packaging. It protects against scratching and abrasion, and against rust. Also available as a booth coat protection.



THE STRIPLASTIC COMPANY

Among many advantages, it is non-toxic, possesses great tensile strength and is easily stripped off in one piece. Write for complete information on this new strippable plastic.

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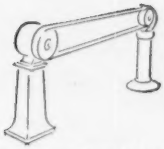


BACKSTAND-BELT GRINDING INCREASES PRODUCTION IN POLISHING AND FINISHING

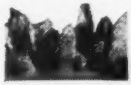
The coated abrasive belt used in conjunction with contact wheel today is established as an efficient production tool. For grinding, polishing and finishing hundreds of consumer and industrial items, the backstand-belt method today has been proved much more efficient and economical than has the old set-up wheel method.

Five Advantages

Manufacturers who have switched from the set-up wheel method point to five distinct advantages of the backstand-belt method over the set-up wheel . . .

• An abrasive belt is a scientifically made tool, manufactured under controlled atmosphere conditions by experts utilizing modern making equipment. The photomicrographs compare the crude, uncontrollable rolled-on cutting surface of typical set-up wheel (A) with the coating on an Armour Abrasive Belt (B). Note how the sharp cutting points on the factory-coated belt are exposed to provide faster, cleaner cutting action—increased production.

A



B

• The coated abrasive belt cuts cooler because of the longer interval between work contacts.

• Inexperienced help can be quickly trained to operate a backstand-belt machine. Skilled personnel needed to dress set-up wheels can be used elsewhere.

• It takes only a few seconds to change an abrasive belt.

• The temperature-controlled room used for curing set-up wheels can be released for other more productive uses.

Actual Case History

The W. L. and Metals Company used a hard, set-up polishing wheel on aluminum sand castings for aircraft and transportation industries. The wheels had to be inspected constantly for out-of roundness.

When the company changed to the backstand-belt method, removing gates and fins from castings was no longer a drawback to production. With this new method abrasive costs were lower and the finish much better. The entire operation was speeded up 50-60%.

It will pay you to investigate the modern backstand-belt method. Write today to the Coated Abrasives Division, Armour and Company, North Benton Road, Alliance, Ohio, for the booklet — "Facts about Backstand-Belt Grinding and Polishing."

Need Coated Abrasives? Call Armour!

Backstand belts are only one item in Armour's complete line of coated abrasives. Alundum, Garalun, Garnet and Crystolon come in rolls of paper, cloth or combination . . . in sheets for hand sanding in belts, discs, and other specialized forms.

Whatever your products or specialized needs . . . one of Armour's complete line of metal-working abrasives is *right* for you.

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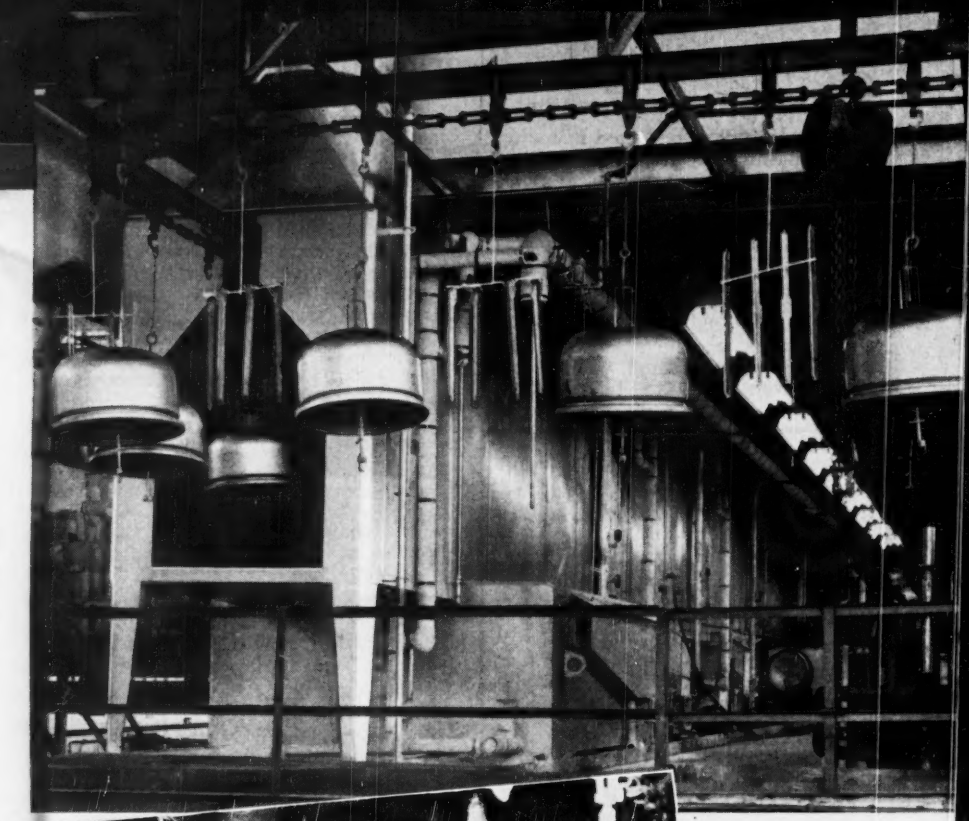

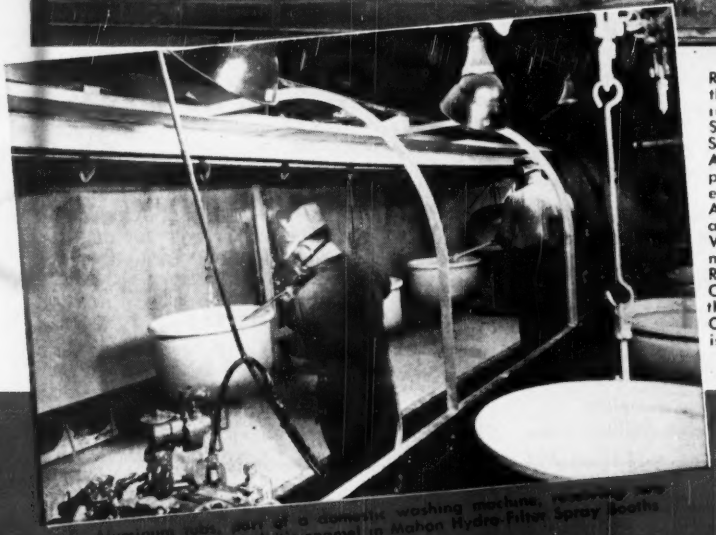

Aluminum tubs, parts of a domestic washing machine, receiving two coats of special synthetic enamel in Mahon Hydro-Filter Spray Booths

Right Above: Spraying Synthetic Enamel on steel parts in a Mahon Hydro Filter Spray Booth. Above: Mahon Six Stage Metal Cleaning and Aladizing Machine. In this phase of the finishing process, parts are subjected to: Alkali Cleaner, Mild Alkali and Emulsion Solution, Cold Water Rinse, Aladine Treatment, another Cold Water Rinse, and finally a mild Chomic Acid Solution. Parts then proceed through Dry-Off Oven, Spray Booths and Finish Baking Oven.

M

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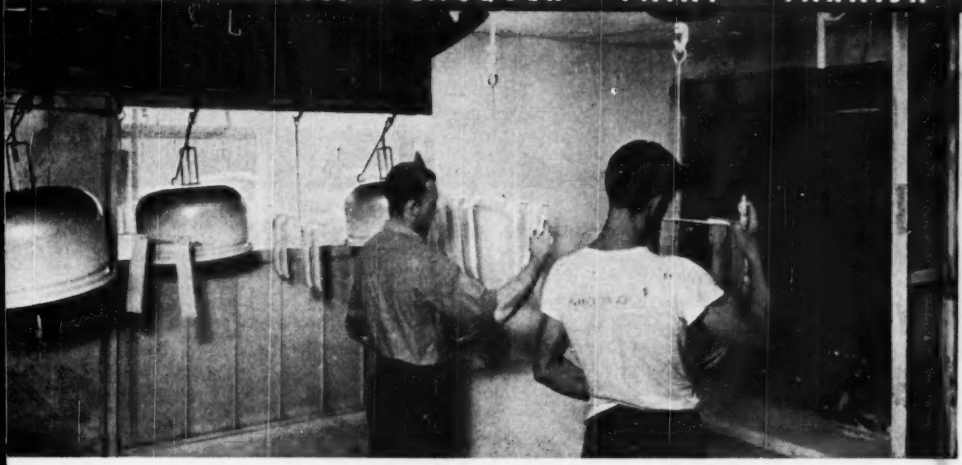

Enamel Coating of ALUMINUM SURFACES Requires Special Processing for Durability!

In planning this complete finishing system for enamel coating aluminum tubs, along with other steel parts on the same conveyor line in the plant of a household appliance manufacturer, special processing and procedure were developed to produce a durable, alkali resistant coating on aluminum which would stand up under severe conditions of wear and impact The complete system was planned, engineered and installed by Mahon . . . it consists of a six stage Cleaning and Aladizing Machine, Dry-off Oven, two Hydro-Filter Spray Booths—one for aluminum tubs, the other for steel parts—a Filtered Air Supply System, and an Enamel Baking Oven. This is another typical Mahon solution of finishing equipment requirements to produce specific results. If you are contemplating new finishing equipment, or are faced with a finishing production problem, you can turn to Mahon with complete confidence—because, the Mahon organization has pioneered development in this highly specialized field for twenty-nine years . . . this twenty-nine years of experience, which covers every industry where finishing constitutes a major production operation, together with constant research and experimentation, has endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. See Mahon's Insert in Sweet's Mech. Ind. File, or write for Catalog A-649.

THE R. C. MAHON COMPANY

HOME OFFICE and PLANT, Detroit 11, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Pickling Equipment, Metal Cleaning and Rust Proofing Equipment, Dry-off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply Systems, and Drying and Baking Ovens. Also, Core Ovens, Hydro-Foam Dust Collectors, and many other Units of Special Production Equipment.

AHON

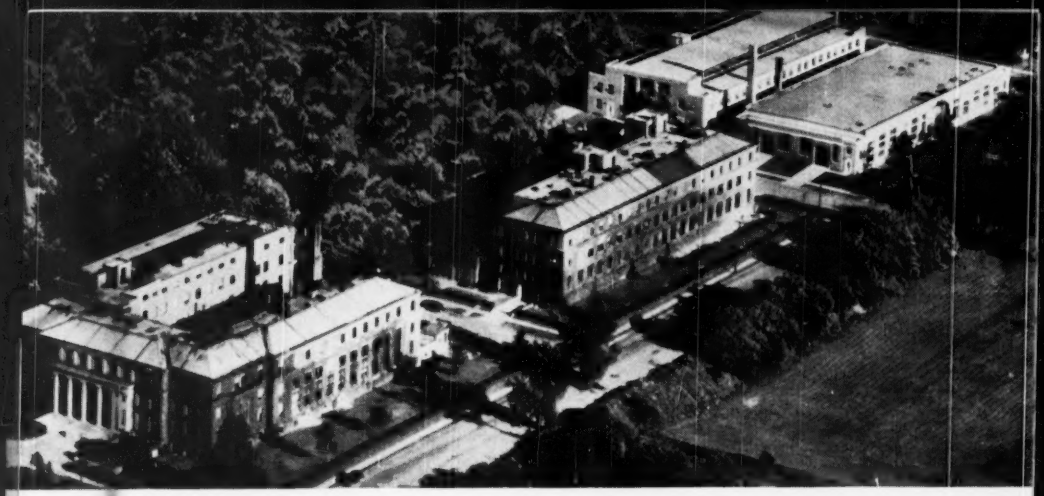

Fig. 1—An aerial view of the main buildings of Battelle Institute. A new structure now being erected to the left of the center building will bring the total floor space of the Institute to one-half million square feet.

Battelle Research Aids the Finishing Industry

By R. O. STITH
Battelle Memorial Institute

BATTELLE Memorial Institute of Columbus, Ohio is an endowed institute which was founded "for the purpose of education . . . the encouragement of creative research . . . and the making of discoveries and inventions" for industry. Since its doors were opened in 1929, Battelle has served more than a thousand sponsors by developing new materials, products, and processes, and by improving old ones; by reducing costs; rectifying the causes of manufacturing failures; making technical-economic studies; and in many other ways assisting industry through research. At present, over 1200 research workers at the Institute are engaged in investigations related to many industrial fields.

Any corporation, group, or individual underwriting work at Battelle is known as a sponsor. If a project is accepted by Battelle, a contract is executed between the Institute and the sponsor which fixes the sponsor's cost

at a definite sum, provides that all discoveries and patents made during the period of contract belong to the sponsor, and provides that no publication of the work can be made without the consent of the sponsor.

All of the Institute's sixteen research divisions, an excellent technical library, and many service departments are available to help solve a sponsor's problem. Among these are completely equipped glass-blowing, carpenter, and machine shops for the construction of special apparatus and equipment; X-ray, spectrographic, electron microscope, analytical and electrochemical laboratories; and photographic and drafting departments.

Among the types of finishing research conducted at the Institute are included (1) electroplating, electroforming, and electropolishing; (2) organic finishing, and (3) corrosion technology.

Today, electroplating is being transformed from an art into a science, and new applications are appearing at frequent intervals. In addition to its decorative uses, electroplating is being used to secure desirable engineering properties. Thus, certain metal plates on special steels have been used to improve performance of equipment designed to operate at high temperatures. In other instances, improved glass molds of cast iron have been developed for a large glass manufacturer by applying chromium plated surfaces to the molds; and other tools, molds, and dies for high and low temperature services have been given longer life by electroplating.

The co-deposition of two or more metals in order to form an alloy coat is a field in which Battelle has pioneered. Many decorative, protective, and engineering applications have already been found for alloy plating in

Fig. 2—This plating unit is a focal point of much of the Institute's research in electroplating and electropolishing. Designed for flexibility, it permits the setting up of complete cleaning, plating, and electropolishing cycles on a pilot plant basis.

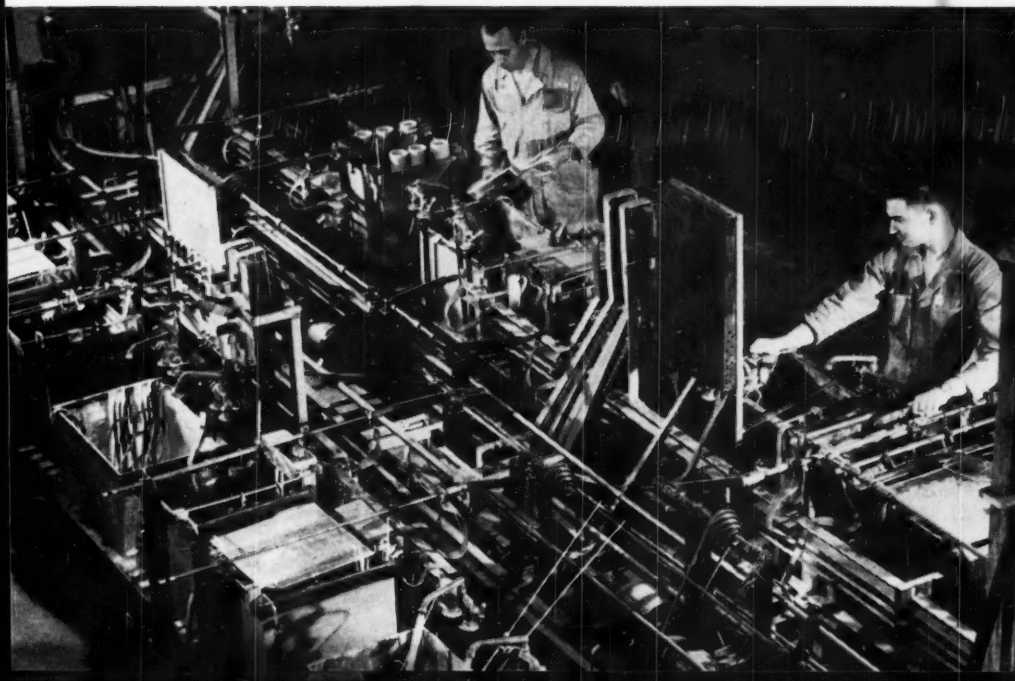

Fig. 4—Chemical polishing of metals is a field in which Battelle has conducted much research. One of the results of this work is a simple process which is suitable for the polishing of articles of intricate form, such as costume jewelry and parts of manufactured products. In the picture the technologist is polishing an article by immersing it in a hot liquid. In the foreground are various products polished by chemical immersion. The three automobile thermostats near the center of the picture and the two dome-shaped articles at the left effectively illustrate "before" and "after" effects.

industry; and additional applications will no doubt be found since the use of alloy plating may often reduce costs by eliminating the use of a high-priced metal, and since the process may even be used to produce alloys in cases where other methods have failed.

Alloy plating has been found to be particularly advantageous in bearing manufacture, and Battelle technologists have been engaged in this type of research for more than 12 years. In particular, they have pioneered in the development of silver-lead bearings which stand up extremely well in aircraft and other heavy-service internal combustion engines.

Another outstanding achievement of the Battelle laboratories is a process for the electrolytic polishing of metals. The process has a great many industrial applications and makes available at a relatively low cost a superior surface finish for stainless steels, standard steels, nickel, copper, brass, aluminum, zinc, Monel, and nickel-silver.

In electropolishing, the work is made the anode in an electrolytic process that is

Fig. 3—Plating from organic electrolytes holds promise for new metallic finishes. Some metals that cannot be plated in water solutions are depositable from organic electrolytes. This is a special apparatus used at Battelle in exploring this field.

the reverse of metal plating. Metal is uniformly removed from, instead of deposited on, the work. The most obvious use of the electropolishing process is to improve appearance; however, it is also used for uniform metal removal in cases where appearance is unimportant, and for treatment of metals prior to heavy plating.

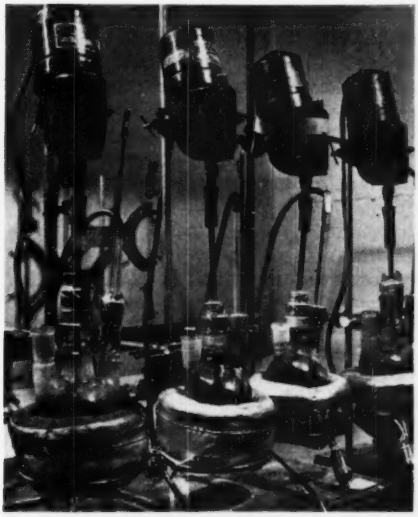

Fig. 5—These reaction vessels in Battelle's paints and plastics laboratories are used in preparing varnishes and alkyd resins for synthetic enamels and industrial finishes. These units provide flexible setups for maintaining inert atmospheres over the cooking resins. Either inert gas or solvent reflux can be used.

Research in the organic coatings field has been in progress at Battelle for the past ten years. In the Institute's paint and plastics laboratories are both the equipment and personnel required for undertaking almost any study pertaining to organic finishes.

In the resins laboratory resins may be prepared under carefully controlled conditions. In the paint laboratory various machines are available for the evaluation of all types of organic protective and decorative coatings, including a "weatherometer" apparatus.

Fig. 6—A water-washed spray booth in a coating laboratory at Battelle. The fixture in front of the water sheet is used in applying uniform thicknesses of films of paints and lacquers to test panels. The panel moves at a uniform rate of speed through the spray, which is emitted from a stationary spray gun.

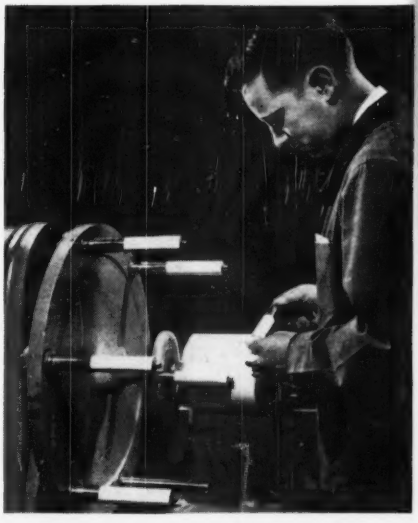

Fig. 7—The Institute conducts research on the coating of varied commercial products. This is a setup for coating collapsible tubes, such as toothpaste and shaving cream tubes, on a semi-production scale.

Fig. 8—Many specifications for organic coatings for metal call for suitable dielectric properties. This is an instrument for determining those properties. Measuring the resistance to breakdown of an organic film under electric voltage is helpful in ascertaining the protective value of the coating against corrosion.

Outdoor exposure studies are made both at Columbus and at the Institute's North Florida Research Station at Daytona Beach, Florida. Pilot plant facilities make possible the translation of laboratory data to a semi-works production scale, thus permitting accurate prediction of production results.

Among the significant contributions of Battelle chemists to paint technology may be included the development of drying oils and resins from petroleum, the utilization of tall oils in coatings, the development of collapsible tube coatings, and the development of anti-fouling paints.

At Battelle, investigations of corrosion have resulted in the development of improved alloys and methods of finishing. Specific corrosion problems which have been studied include corrosion of storage tanks by the contained fluid, corrosion of domestic gas-fired appliances, and corrosion of refrigerator parts by commercial refrigerants.

In most cases, "tailor made" answers are required for industrial corrosion problems. The final answer for each corrosion problem depends upon what is to be resisted—oil, sand, water, acid, and so on—and the definition, in the particular case, of resistance. In the course of its service to industry, Battelle has suggested ma-

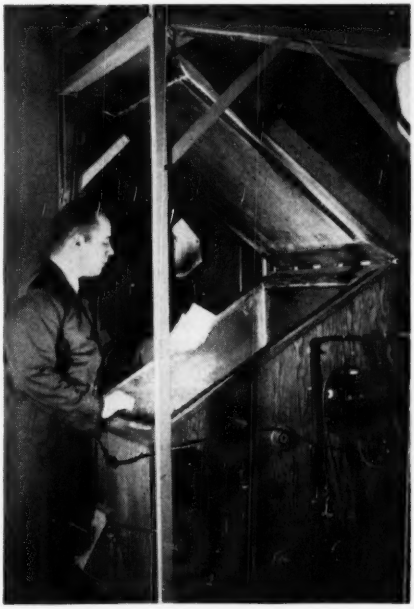

Fig. 9—High humidity conditions at controlled temperatures for the evaluation of finishes can be provided by this humidity cabinet. In practice, the test specimen is supported on a metallic member which is maintained at a fixed lower temperature than that of the atmosphere above. The constant temperature differential results in continuous and controlled moisture condensation.

Fig. 10—Dozens of these small corrosion test cells are used by Battelle technologists for studying the ability of coatings to resist the corrosive actions of liquids such as those that might be packaged in steel containers. Removable coated steel plates comprise the end sections of each of the small "containers." The liquid is put in the cell through a hole in the top of the glass cylinder. Corrosive action on the coated ends can readily be observed.

terials to provide greater corrosion resistance and has developed corrosion-resistant alloys.

Four popular pastel colors are now being standardized by the makers of porcelain enameled steel bathroom fixtures. The pastel fixtures will sell for a price which is only slightly more than the price of plain white fixtures.

NEW DISPLAY AND SHIPPING CARTONS—Clean crisp lines of modern design have been injected into Armour & Co.'s Bull's Head flint paper display and shipping cartons by Robert Sidney Dickens & Associates, Chicago designers. The new designs have not only created a package far stronger in point-of-sale display value, but the use by Dickens of Armour's well-known maroon logotype used on its meat products emphasizes product identity. The new trade character, with a size in keeping with its importance on the package as determined by market tests, has high legibility, reproduces well on the package and in all types of advertising, and is an eye stopper. The pull - back sleeve drawer type cartons, containing assorted flint paper grits, are sold to consumers by hardware and paint store and chain and mail order organizations.

Spotlighting FINISHING Progress

Urea And Melamine Resins in Surface Coatings

By DR. ALLEN G. GRAY

A Monthly Digest of Current Technical Progress Indicating Significant Trends and Developments in the Finishing Industry

DEVELOPMENTS in amino resins for surface coatings have opened up to the metal products finishing industry new fields for business and new standards of performance for its products. Advances in the chemistry and application of the thermosetting amino resins have not only permitted the production of better and more economical finishes in established fields, but, by reason of speed of cure and excellent film integrity of these resins, have allowed the surface coatings industry to expand into new fields. This general group of resins, when used in baking finishes, reduces the baking time, produces a mar-proof surface, is water white and shows excellent color retention, and improves chemical resistance and durability.

Some important facts relating to the chemistry and applications of urea and melamine resins for surface coatings were brought out by W. C. Norris and J. C. Bacon, American Cyanamid Company, as part of a recent course in surface technology jointly sponsored by the Detroit Paint, Varnish and Lacquer Association, Detroit Production Club, and Wayne University. When urea and formaldehyde are reacted under neutral, or slightly alkaline conditions, crystalline methylol ureas are obtained. The monomethyl and the dimethylol compounds are obtained when one or two moles respectively

Simplify production with economical vapor degreasing

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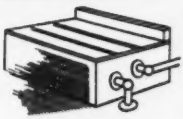
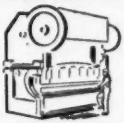


BEFORE PLATING



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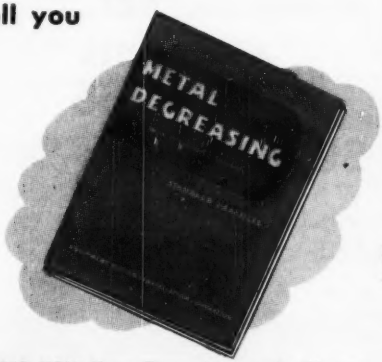
Get outstanding results with new, improved "Triclene" D Trichlorethylene

"TRICLENE" D is the most stable grade of Trichlorethylene yet developed by Du Pont for metal degreasing. It stands up against contaminating and destructive materials which may be introduced in degreasing . . . assists materially in carrying out efficient cleaning.

INTRODUCING "PERCLENE" D

A new degreasing grade of Perchlorethylene for use in metal drying and other vapor degreasing operations in which a higher boiling solvent may be desirable.

Let this book tell you



READ HOW Vapor Degreasing can simplify production . . . save you time and unnecessary costs. Read why the results obtained can't be matched by any other method. It shows typical compact equipment available for efficient and economical operation. And it gives information about solvents used in this equipment—Du Pont "Triclene" D Trichlorethylene, and Du Pont Trichlorethylene and Perchlorethylene—which under various trade marks have been widely used for many years. Send for it today!

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Please send me my copy of "Metal Degreasing—Standard Practices."

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of formaldehyde combine per mole of urea. According to Norris and Bacon, the latter is the commonly-used solid intermediate for surface coating resins and at present is available commercially as a white solid containing 88-90 per cent dimethylol urea with a formaldehyde-urea ratio of 2.0 to 1.0, and 10-12 per cent water.

The solid dimethylol urea will remain quite satisfactory for conversion to coating resins for several weeks, but upon prolonged storage both uncontrolled resin formation and conversion to the undesirable methylene ureas take place. Dimethylol urea is extremely soluble in water, slightly in lower alcohols, but insoluble in most other organic solvents.

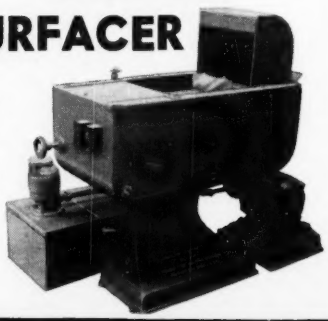
Resin Formation Process

The process of resin formation in contrast with the formation of methylol and methylene ureas is a slow one which takes place in both slightly acid and alkaline solutions. Time and temperature are the critical factors. Although the resinification reaction is more rapid under acid conditions, preliminary condensation under alkaline conditions has been found to eliminate the danger of methylene urea formation. After this precaution has been followed, the syrup is acidified, and heating continued until polymerization has proceeded to the desired degree.

Resin formation takes place through the elimination of water and, in the advanced stage, formaldehyde and water. It has been proposed that these losses result in the formation of both ether linkages, such as are shown in type A, Table I, and methylene linkages, illustrated by type B, Table I. It should be kept in mind that the chemistry of amino resins is extremely complex because of the large number of variables involved in the formulation of these resins and the fact that the amino compounds are known to exist

Production Announces!

A NEW SIZE PEERLESS WET BELT SURFACER



In addition to our now popular 20" and 14" sizes this smaller Surfacer is ideal for surfacing parts within its capacity.

A smooth accurate finish may be obtained on die castings, forgings, metals, plastics, etc. This Surfacer often replaces expensive machine tool operations.

Send us samples of your work for full laboratory report — No obligation.

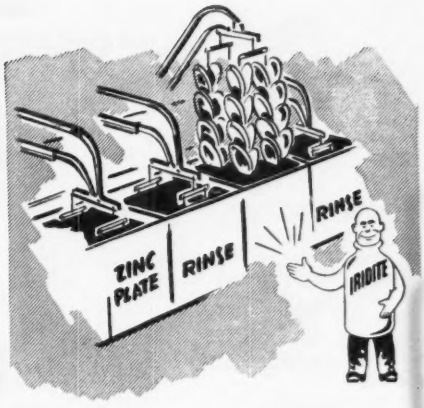
Production MACHINE COMPANY GREENFIELD, MASSACHUSETTS, U.S.A.

Now--a one dip

IRIDITE

bright finish for

AUTOMATIC ZINC PLATING



Common Chemical Addition Eliminates Caustic Rinse —Permits Amazing Low Cost

The one-dip Iridite Bright treatment for standard automatic zinc plating machines has been proved successful and is now being used in production runs.

Resists Corrosion—Protects from Stain

This amazingly low cost protective and brightening process produces a shining stain-free surface with good corrosion resistance . . . utilizing only the normal number of tanks after the zinc plating operation: rinse, Iridite, rinse.

Simple to Operate—No Bleaching Dip

This special one-dip Iridite Bright is a non-electrolytic chemical solution . . . operates at 80 to 85° F . . . with no specially trained personnel . . . equally adaptable to bulk plating of parts. Eliminates need for second or bleaching dip.

ALLIED RESEARCH PRODUCTS, INC.

4004 EAST MONUMENT STREET

BALTIMORE 5, MD.

Whatever your problem in finishing zinc or cadium —there's an Iridite to do the job. For details, write —wire—or 'phone.

TABLE I

	M.P.	Mol. Wt.	Solubility: Water	Solubility: Mineral Spirits	Solubility: Alcohol	Catalyst Sensitivity
UREA + CARBONIC ACID	132.7	60	80g./100	0	15g./100	0
+ $2CH_2O$						
DIMETHYLOL UREA + BUTANOL	126	120	Very Sol.	0	Slight	Very High
* (A) $NHCH_2OCH_2NHCONHCH_2OC_4H_9$ C=O $NH\text{-}CH_2NHCONH$---- (B) RESIN	Resinous	–	0	Good	∞	High
MELAMINE + CYANURIC ACID	354	126	0.5g./100	0	Very Slight	0
+ $6CH_2O$						
HEXAMETHYLOL MELAMINE + BUTANOL	d	276	1.4g./100	0	Very Slight	Very High
* $(HOCH_2)_2N$-C(N=C(N-CH_2-OCH_2---)-N=C(N-CH_2-OCH_2---)-N=C)-$N(CH_2OC_4H_9)_2$ RESIN	Resinous	–	0	Very Good	∞	Low

Simplified reactions showing formation of urea-formaldehyde and melamine-formaldehyde coating resins

(Illustration courtesy American Cyanamid Co., New York 20, N. Y.)

in tautomeric forms. However, certain structural formulas have been postulated which are convenient to express the general reaction.

In discussing methods used in practice to prepare the coating resins, Norris and Bacon reported that two types of urea formaldehyde intermediates are used; namely, aqueous syrups and solid dimethylol urea. The latter may be prepared by the reaction of urea with two moles of formaldehyde at a controlled pH and temperature, or by spray or tray drying alkaline condensed urea-formaldehyde syrups. The aqueous syrups are used in their dilute form or may be partially dehydrated by vacuum concentration before processing.

The next step in preparing coating

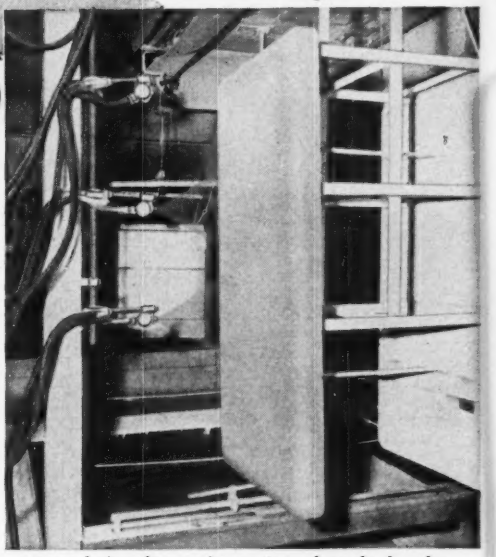
Now It's A Breeze
TO WATER WASH AN AUTOMATIC SPRAY

with a

DESPATCH

Uniform Velocity SPRAY BOOTH

Stratification and air turbulence are eliminated in this booth designed for electrostatic and other low pressure automatic spraying. Make-up air distributed evenly through filters covering entire back wall and air outlets at four levels across the front curtain provide uniform air movement over entire face of the booth. This uniform air flow and low pressure spraying through an electrostatic field reduces paint losses. Filtered air in conveyor vestibules provides effective seals against factory air and dirt. Water up to 50 gals. per minute per lineal foot applied to the split curtain minimizes paint accumulation. Splashing is eliminated by a specially designed wet splash guard. Water flowing over the booth-floor collects overspray and carries it to settling tanks for recovery. Pictured is the prime coat booth in the Seeger Refrigerator Plant, St. Paul, Minn.



Water wash spray booths for automatic or hand spraying and dry spray booths are designed for maximum efficiency and are available to any specifications. DESPATCH engineers will gladly analyze your requirements and plan, select, coordinate and install individual units or a complete finishing system.

WRITE TODAY for Bulletin 66 or request a representative to call.

Standard Despatch Water Wash Spray

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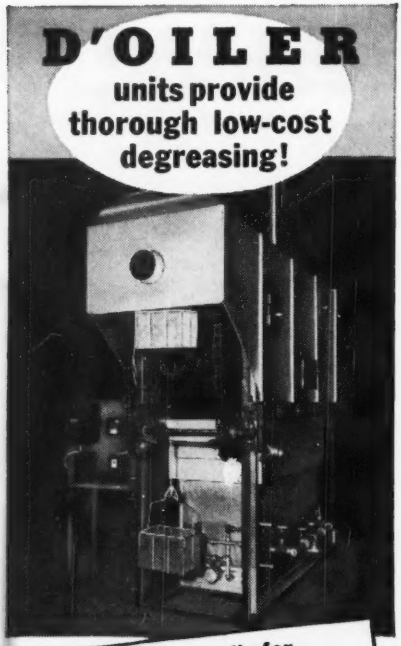

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D'OILER engineers — pioneers in solvent degreasing and de-oiling—have developed a D'OILER model for every purpose . . . volume work and small batch dips, hand-operated or automatic, one dip or three dip, vapor spray machine or custom-built devices for special jobs. Illustrated above is a three dip automatic for batch degreasing of small parts.

Avoid the pitfalls of improper degreasing methods by getting the expert recommendations of our technical staff.

*There are metal cleaning problems which are solved by methods other than degreasing; we shall inform you frankly and thoroughly of the methods best suited to your operations.

Our long experience is ready to help you do a finer, faster cleaning job. For D'OILER information on your degreasing operation, WRITE TODAY.

Mechanical
PROCESS COMPANY
P. O. BOX 88, SOUTH ORANGE, N. J.

resins of this type is the dispersion of the dimethylol urea or an alkaline condensed syrup in acidified butanol. This dispersion is then heated to effect simultaneous etherification and polymerization both of which reactions liberate water. All of this water, and any which might have been present in the intermediate, must be removed in order to obtain an acceptable product. Several practical methods have been developed for doing this. The final resin solution generally contains approximately 50 per cent solids, and there may be as much as 0.5 per cent water and 0.2-0.5 per cent free formaldehyde present. The structure and composition of the resins may vary widely according to the method of preparation; for purposes of illustration, one simple type structure is shown in Table I.

Several general results have recently been brought out with reference to the structure of the resin materials which are of interest to the finishing technologist. As a rule, as the formaldehyde content in the initial stage of preparation is raised, the viscosity of the resin solution decreases, the oil and hydrocarbon compatibility is improved, and the rate of cure lowered. As the quantity of butanol used for the dispersion is increased, compatibility is improved, viscosity is lowered, and the rate of cure may be somewhat reduced. If the amount of etherification catalyst is increased, improved compatibility and higher viscosity are initially obtained, but further quantities are apt to cause gelling. The presence of excessive amounts of etherification catalyst must be avoided for best stability of the solution.

Melamine Coating Resins

Although melamine, like urea, has been known to chemists for over one hundred years, it has become commercially available only within the last eight years. The extreme differences in the properties of melamine and urea are illustrated by the comparisons

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The initial cost of Platecoil is often 50% or more below the cost of equivalent pipe coil depending, of course, on the materials used in construction.

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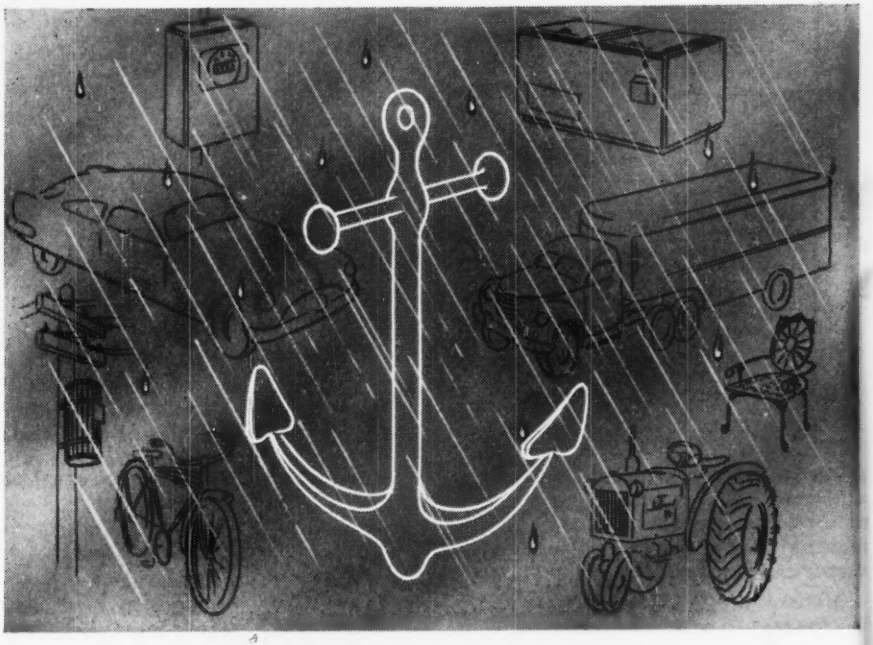

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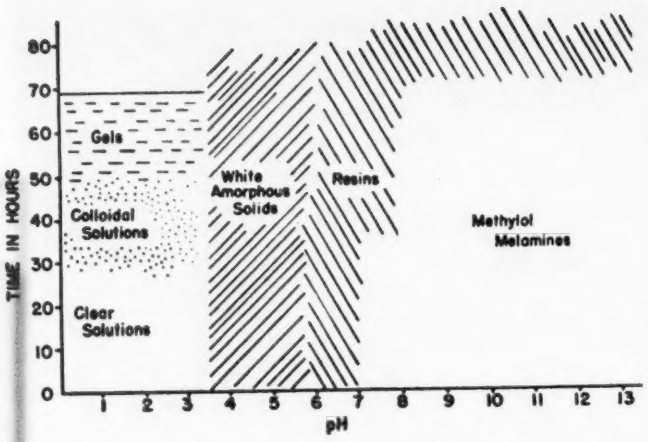

Fig. 1—The type of melamine - formaldehyde condensation products obtained under various pH condiitons is illustrated in this figure based upon the use of 3 moles of formaldehyde. (*Illustration courtesy American Cyanamid Co., New York 20, N. Y.*)

given in Table I. Urea is low melting and extremely water and alcohol soluble, while melamine is very high melting and relatively insoluble in water and alcohol.

Melamine, and other amino trazines in contrast to urea, are unique in that both hydrogens of the amino group may readily be replaced by formaldehyde. For this reason, the reaction products with formaldehyde are more numerous and complicated than is the case with urea, and it has been more difficult to establish the exact composition of the various products. As is the case with urea, the nature of the reaction products is dependent upon the pH, formaldehyde ratio, temperature, and time of reaction. Initially, melamine and formaldehyde react to produce simple methylol derivatives which, in contrast to the parent compound and the finished resins, are less stable than those of urea and decompose on heating. Figure 1 is the graphical representation of the actual types of condensation products obtained under various pH conditions as presented by Norris and Bacon. This representation is based upon the use of three moles of formaldehyde but is similarly applicable for other ratios.

Because of the complexity of the reaction and the influence of a large number of variables, the limits should be considered as approximations only.

Resin Preparation

For commercial use as such, melamine-formaldehyde reaction products are prepared by heating together melamine and the appropriate quantity of formaldehyde at the proper pH until the desired degree of condensation is obtained. Some of these products, depending upon the formaldehyde content and degree of resinification, may be employed as intermediates for the preparation of coating resins; but generally for this use they are not isolated prior to further processing.

As is the case with the urea compounds, the finishing technologist should keep in mind that it is necessary to modify the initial melamine-formaldehyde reaction products with alcohols if sufficient compatibility with alkyd resins for surface coatings is to be had. Although the melamine derivatives require acid conditions for etherification, as do the urea derivatives, smaller amounts of weaker acids suffice for the reaction. Since the polymerization rate of methylol melamines is greatest at the lower formaldehyde ratios, it is necessary to use from 4 to

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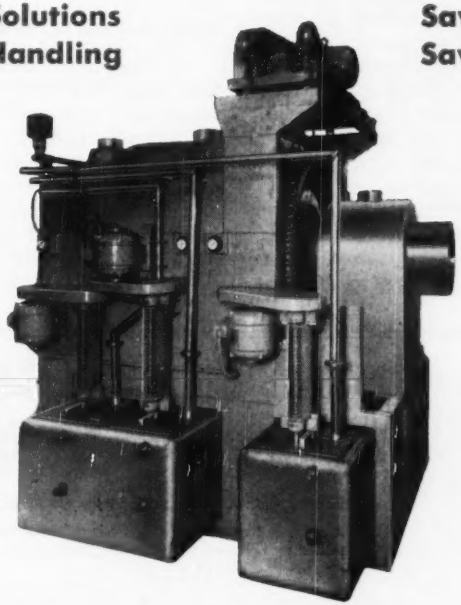

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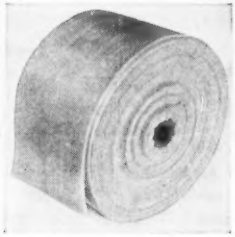
6 moles of formaldehyde in order to prevent excessive resin formation during processing and also to produce the desired compatibility.

The same general effects on viscosity, compatibility, and cure are observed with melamine resins as were pointed out for urea resins, when the quantities of formaldehyde, butanol, and acid are varied. The completed melamine resin, again like the urea resin, is a solution of about 50 per cent resin solids containing up to 0.5 per cent water and 0.5 per cent free formaldehyde. The formaldehyde-melamine ratio is generally between 5 and 6 to one, depending upon the final resin characteristics desired. One important difference between the two resins is their susceptibility to catalysts. The types of melamine resins used in surface coatings are sensitive to acid catalysts for curing only in the sense that they do not cure to the desired degree under alkaline or neutral conditions. However, a very small amount of acid is sufficient to cause them to cure at temperatures above 200 deg. F. Additional amounts of catalyst are not generally effective in promoting faster or lower temperature cure. Urea resins on the other hand are quite susceptible to catalysts. Although normally cured at 250-300 deg. F., the temperature or baking time may be reduced as more catalyst is added to them, even to the point where an air drying film may be obtained.

General Uses of Amino Coating Resins

The majority of the amino resins in use today in surface coatings have established their positions by substituting for a portion of a heat curing alkyd resin already fairly well established for some particular use. Finishing men generally agree that no other film forming material so adequately complements the qualities of amino resins as do the alkyds. Certainly, in all but



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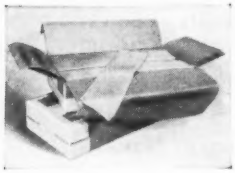

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TABLE II

Resin	Hardness	Resistance			Adhesion	Color		Outside Durability
		Chemical	Water	Solvent		Original	Retention	
Alkyd Alone	Low	Fair	Fair	Fair	Excel	Good	Fair	V Good
Alkyd + Urea	High	Good	Good	V Good	V Good	Excel	Good	Good
Alkyd + Melamine	V High	Excel	Excel	Excel	Good	Excel	Excel	Excel

Film properties of alkyd finishes as compared with combinations of alkyds with amino resins (*Illustration courtesy American Cyanamid Co., New York 20, N. Y.*)

a minor few of the formulations where amino resins are found today, alkyds are also found in amounts varying generally from equal parts up to ten times that of the amino resins. Table II presents comparison data on the film properties of alkyds as compared with alkyds plus amino resins.

Data on unusual properties of alkylated urea and melamine resin surface coatings has been presented as part of a recent Chemical Industries Report by James R. Dudley, American Cyanamid Co. According to Dudley, the alkyd resin imparts qualities of adhesion, toughness, flexibility, and durability; and the urea and melamine resins provide qualities of fast cure, hardness, color, and resistance to heat, abrasion, water, and chemicals. Other advantages are that urea resins flow readily and show good leveling, and they can be used in ordinary equipment without special handling. Combinations of alkyd resins with urea resins cure rapidly, the usual baking schedules being in the range of one hour at 248 deg. F. to 20 minutes at 302 deg. F. In general the hardness of the finish is a function of the cure and of the amount of modifier. It was pointed out by Dudley that because urea resins are very hard in themselves, hard permanent finishes can be obtained from their combinations with alkyd resins. Such finishes also have a high degree of mar resistance which is not obtainable with unmodified alkyd resins.

Color Retention Properties

Good color and color retention has reportedly been obtained at temperatures up to 300 deg. F. from urea resins modified with non-oxidizing alkyd resins. Under normal baking conditions and with amounts of amino resins ranging from a few per cent up to 15 to 20 per cent, this is often the sole effect observed. In fact, with some combinations, the color of whites is sometimes actually lowered a little by these small additions. At some point around 20 per cent, however, all such indifferent and minor effects are overshadowed by the appearance of a pronounced effect on color maintenance.

In practical terms this means that assembly pieces baked in diverse ovens under the usual varying conditions can now match or closely match one another in color. The ability of such coatings to cure quickly at high temperatures is an important factor in infra-red baking. The ratings under color retention, while applicable to all the normal conditions met with in use, are most important in the case of the over-bake or prolonged exposure to elevated temperatures. Where such conditions prevail or may be predicted, melamine resins have become almost

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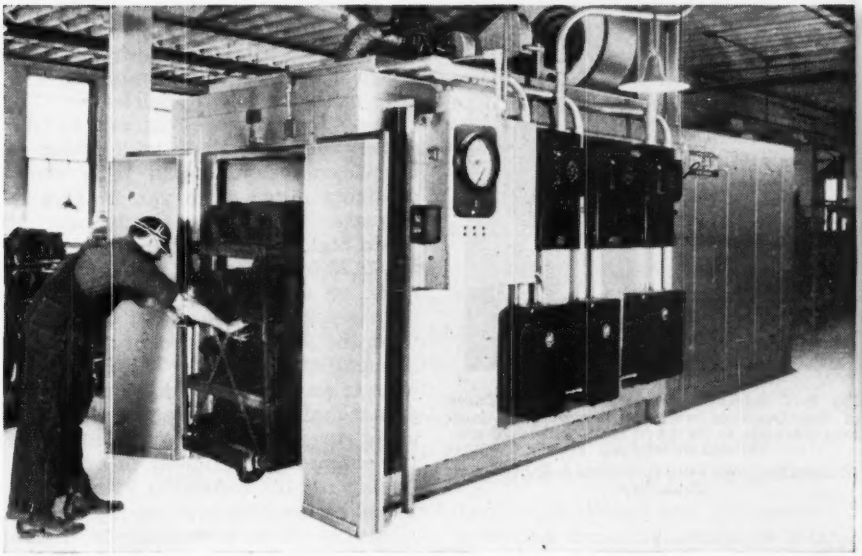

This manufacturer uses two KIRK & BLUM electrically heated, automatically controlled ovens to bake wrinkle finishes on sewing machine parts. In operation, a loaded truck is pushed into the ovens every twelve minutes (automatically timed); when the fifth truck enters, the first is removed at the other end, allowing a total time of 48 minutes in the 20-foot long tunnel. As shown above, automatic controls, recording thermostat and line switches are compactly mounted on the side of the oven. The two ovens have a capacity of 20 truckloads per 8-hour day.

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It has been reported that color retention of both whites and colors on outside exposure, although helped by addition of urea resins, is markedly improved by melamine resins. While urea resin additions improve certain characteristics, are indifferent to some, and detract from others such as gloss retention, melamine resins invariably improve the resistance of alkyds to all the major weathering factors important for exterior durability.

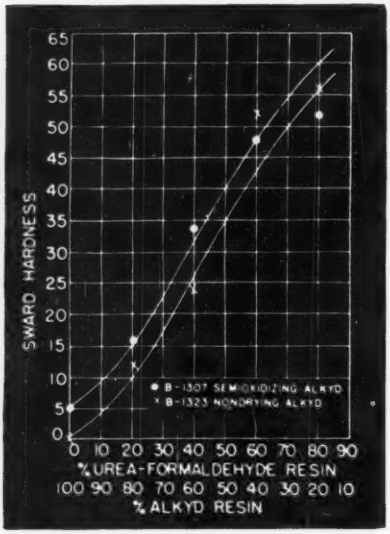

Fig. 2—A marked increase in Sward hardness of the finish is achieved by adding urea-formaldehyde to an alkyd resin, baked 20 minutes at 300 deg. F.

(Illustration courtesy "Industrial & Engineering Chemistry")

Hardness of Finishes Containing Amino Type Resins

In connection with this presentation on the more recent developments of amino resins in surface coatings, it is of significance to bring out work published several years ago by T. S. Hodgins, A. G. Hovey, and P. J. Ryan, Reichhold Chemicals, Inc., which, among other things, brought out the effect of urea-formaldehyde resins on the hardness of alkyd resin finishes. (See also "Ind. Eng. Chem." 32, 334, 1940.) When a typical alkyd resin vehicle used for high-baking refrigerator enamels is baked at 300 deg. F., for 30 minutes, it has been reported to have a Sward hardness of 5. Figure 2 based on the above work shows the marked increase in Sward hardness if varying amounts of urea-formaldehyde resin are incorporated with non-drying and semi-oxidizing alkyd vehicles.

Another point brought out by the above work was that the addition of urea-formaldehyde resin to a semi-oxidizing alkyd resin vehicle greatly increases the grease resistance of white high-baking refrigerator enamals. If 33-50 per cent of urea-formaldehyde, on a non-volatile vehicle basis with respect to the alkyd vehicle, is used, the softening effect of the grease is negligible even after 72 hours. However, it was brought out that the same grease resistance is attained at a much lower urea-formaldehyde content, if the enamels are allowed to age after baking for 168 instead of 72 hours, as would be the case in a commercial application. Urea-formaldehyde resins also increase alkali resistance of finishes, such as are used on washing machines.

In a later article along similar lines, but relating to melamine-formaldehyde film forming resins, T. S. Hodgins, A. G. Hovey, S. Hewett, W. R. Barrett, and C. J. Meeske, Reichhold Chemicals, Inc., presented data, represented graphically in Fig. 3, to show that when melamine-alkyd mixtures are baked for ½ hour at 250 deg. F., they give harder films than urea-alkyd blends, regardless of the ratio of amine resin to alkyd. (See also "Ind. Eng. Chem." 33, 769, 1941.) This tendency exists regardless of the type of alkyd used. Although curves are not

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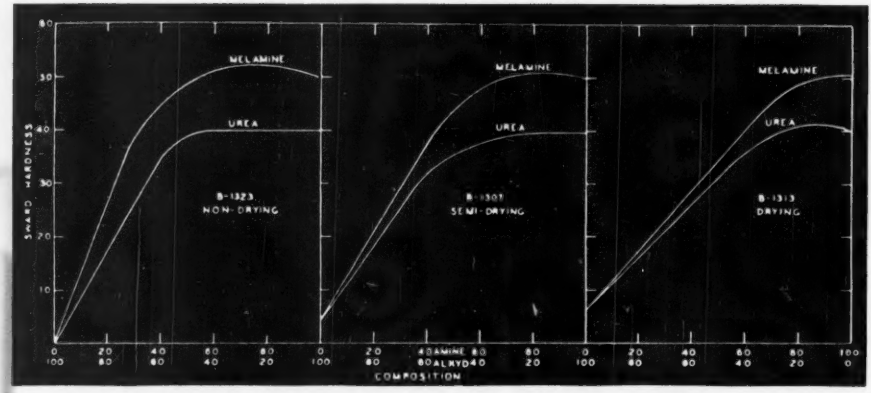

Fig. 3—The above graphs, based on data obtained by baking finishes for ½ hour at 250 deg. F., show that melamine-alkyd mixtures give harder films than urea-alkyd blends, regardless of the ratio of amine resin to alkyd.
(Illustration courtesy "Industrial & Engineering Chemistry")

presented for other times and temperatures, the same tendency prevailed whatever the baking temperature used, and it was found that time influenced the results only to the extent that it is desirable to allow a sufficient period for the amine resins to be converted. It is thus possible to obtain a given hardness with a smaller percentage of melamine resin than urea resin, as is illustrated in Fig. 3. Indications are that hardness increases in direct proportion to the amine resin content until a maximum value is attained, which is determined by the alkyd used.

Compatibility

For best utilization of the good properties inherent in melamine and urea resins, it is important that they mix well with the alkyds. This is termed compatibility and is of utmost importance throughout the manufacture and use of both the amino and alkyd resin components. Compatibility is important because of the bearing it has on subsequent stability, gloss, and even durability. One point in this connection brought out by Norris and Bacon at Wayne University is that one of the most commercially important methods of achieving compatibility is through the use of proper control of pH and temperature conditions during the entire operation of resin preparation. With reference to alkyd component wide use is made of the fact that alkyds containing hydroxy oils are unique in their compatibility with amino resins. One good rule for best results is that the alkyd should be formulated within reason with more polarity and the amino resins in the direction of less polarity.

Baking Amino Resin Finishes

It has been recommended that for best results the freshly sprayed or dipped parts should be left out of the oven for a period of 15 to 20 minutes following application. While this period may under some conditions be reduced, there is always a certain irreducible time limit under which pinholding, p o p p i n g, and flattening troubles are likely to appear. It must be continually kept in mind that the rapid curing properties of alkyd-amino resins, once heat is applied, demands that reasonable time be given to insure the explosion of entrapped air and the more volatile solvents before ex-

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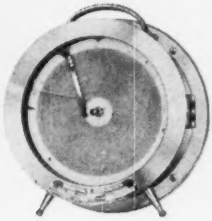

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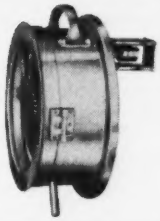

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posure to high temperatures. The inclusion of a small percentage of high boiling solvent is one means of insuring the property, "oven flow", so necessary for smooth films. Table III presents a summary of typical baking cycles. One point of practical interest is that alkyd resins are so sensitive to catalysts that there have been instances where acidic fumes in the finishing room or baking oven resulted in a precuring of the surface, producing a crystalline-like effect.

Special Finish Properties

For finishes where high heat resistance is desired, which usually means resistance to discoloration and gloss, rather large (34-40 per cent of the total resin) amounts of melamine resin are generally used with a short oil non-oxidizing alkyd. The enamels are generally pigmented with titanium dioxide and are used on lamp housings, radiator covers, stove parts, and so on. In formulating for good soap resistance, such as for washing machine and kitchen utensil finishes, high amounts of melamine should again be used, but since adhesion under moisture conditions is also of importance, the alkyd should be longer in oil than in the high heat types mentioned above. Where maximum water resistance and adhesion is called for on washing machines, the use of high-baked, high-alkyd primers is essential.

Refrigerator finishes, like those for washing machines, demand a delicate balancing of components to obtain the desired degree of resistance to humidity, impact, mar, and chemicals, combined with color and gloss maintenance. One recommendation for this application has cited the use of melamine or more often a combination of melamine and urea resins as 25-30 per cent of the total film former, used with part non-oxidizing alkyd and part slightly oxidizing (for best ad-

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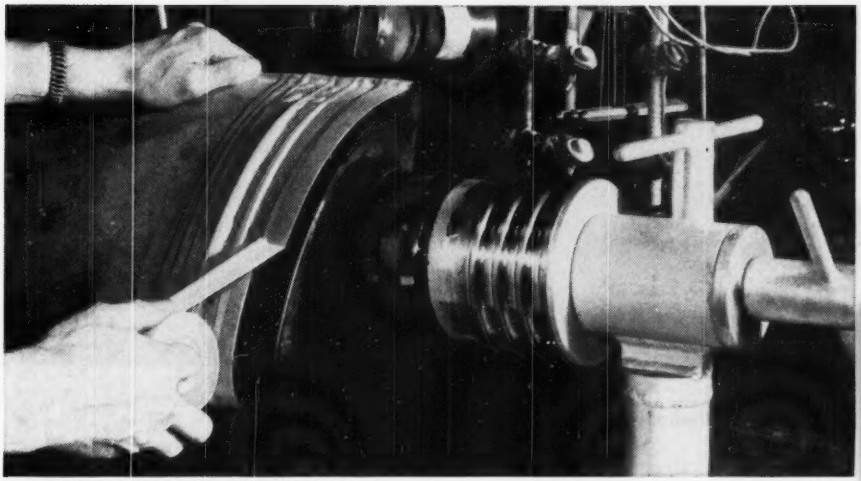

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TABLE III

Alkyd plus Resin Shown	Most Effective Temperature Range in °F	Time in Minutes
Catalyzed Urea	140-200	160-30
Melamine	200-500	40- 1
Urea	250-300	50-15

Summary of typical baking schedules for alkyd-amine resin combinations (*Illustration courtesy American Cyanamid Co., New York 20, N. Y.*)

hesion), or a single alkyd with the right combination of properties.

Clear coatings over metal consume a considerable volume of amino resins. They are generally applied in very thin coats and are baked by all the usual methods. Many of the uses for this type of finish demand a high (in some cases 100 per cent) quantity of amino resins with no alkyd present. Maximum resistance to cigarette burns, in one example of an application of these finishes, is obtained over silver and brass.

* * *

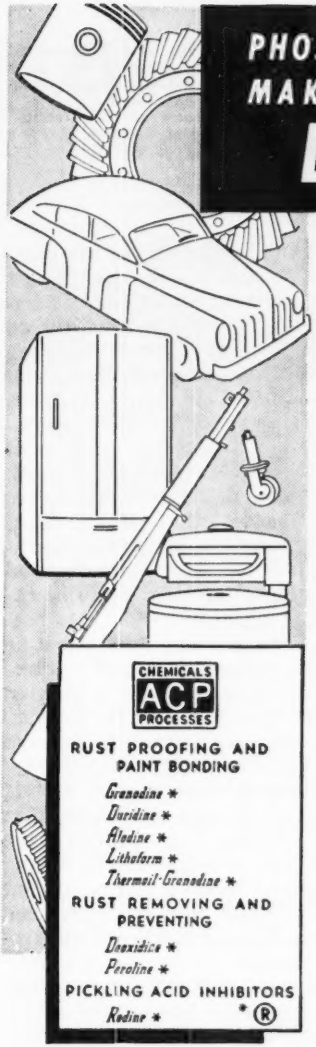
Electropolished Surfaces Possess Many Unusual Characteristics

DR. CHARLES L. FAUST, Battelle Memorial Institute, in a recent issue of the "Journal of the Electrochemical Society" has pointed out some of the unusual characteristics of electropolished metal surfaces. The report is based on a paper presented earlier before the Surface Reaction Symposium held in Pittsburgh.

According to Faust the outstanding achievement of electropolishing is its ability to remove metal without mechanical action of any kind. Thus, smoothening and brightening are accomplished without introducing mechanical working effects, frictional heating, fragmentary metal particles, distorted crystal structure, or stresses. The electropolished surface reveals directly, in the outermost layer, the true structural condition of the basis metal.

It was brought out by Faust that aluminum and stainless steel are greatly improved in corrosion resistance as a result of anodic treatment. This improvement, it was pointed out, has experimentally been shown to be due to the presence of a solid film, transparent but, possessing a finite thickness. The presence of such a film has been shown to exist on electropolished stainless steel. In addition, it was stated by Faust that the reflectivity of electropolished surfaces compares favorably with that of those produced by mechanical finishing methods.

Continuing the discussion of the special properties of electropolished surfaces, Faust stated that aluminum electropolished in a sulfuric-phosphoric-chromic acid solution is improved in uniformity of surface activity so that subsequent anodizing produces a more uniform and protective coating, and dye colors, if used, have a deeper and richer "tone." Likewise, it was brought out that oxidation re-



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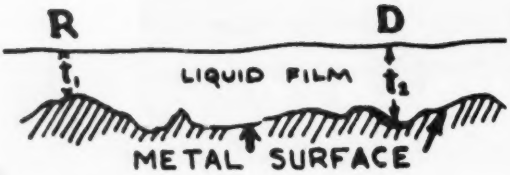

Fig. 4—Schematic sketch described by Faust showing liquid film on a metal surface under electropolishing conditions. *(Illustration courtesy The Electrochemical Society, New York, N. Y.)*

actions, such as those which impart black oxide coatings to steel, produce more uniform color with greater luster, with less critical control being required when surface preparation is by electropolishing.

Electropolishing, by removing surface stresses, considerably changes the fatigue limits of metals. Experiments have been performed which show that electropolishing of certain steels considerably raises the fatigue limit and aids in its measurement by reducing the scatter of experimental values. Other studies show that the fatigue limit of steels is generally lowered by electropolishing. As explained by Faust, this is because the customary mechanical finishing methods introduce strain-hardening and compressive stresses that increase fatigue resistance. When there is no mechanically disturbed layer, such as when very careful mechanical polishing is used, the fatigue limit is the same as for electropolished steel. If there has been heavy surface decarburization, then electropolishing to remove such a "decarb" layer will increase the fatigue limit.

Electropolishing also has been reported to have an important effect on mechanism parts. Because of reduced friction, electropolishing of parts in a wire sewing machine permitted a considerable increase in speed. Electropolishing of duralumin cartridge cases improved the ease of automatic extraction without jamming caused by the rough state of the as-drawn surface.

In connection with the surfacing of one metal with an electrodeposited coating of another for use of the component in industrial service, Faust stated that electropolishing has an important role. This is particularly so when the "interface zone" between basis metal and electrodeposited metal will be subjected to heavy stresses during functional use. Mechanical finishing can so damage the surface of the basis metal as to make it too weak to properly support the overlay metal. It was emphasized that electropolishing as the "surface machining operation" provides for the maximum bond strength and adhesion that can be expected.

Figure 4 was presented by Faust as a schematic representation of electropolishing conditions. It was pointed out that in consequence of the unequal thickness, the resistance drop through the film is greater at "t_1" than at "t_2" and anodic dissolution is more at "R" than at "D." It was explained that this results in the disappearance of the roughness and produces the polishing effect. Figure 5 shows a plot of current vs. anode potential in electropolishing. For a given metal in a selected electrolyte, the current will increase according to the line ABCDEF, as the anode potential increases. In one type of solution, electropolishing will take place at I_1, at voltages V_3 to V_4, that is, along the DE branch of the line. With a different metal and another solution, the general plot will be line ABCDEF, but electropolishing will be under conditions represented by region BCD, involving a periodic fluctuation in voltage in the range V_2 to V_3, with a corresponding fluctuation in current be-

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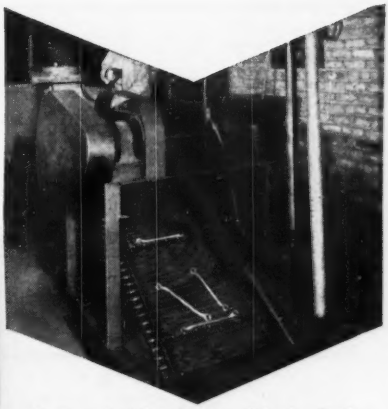

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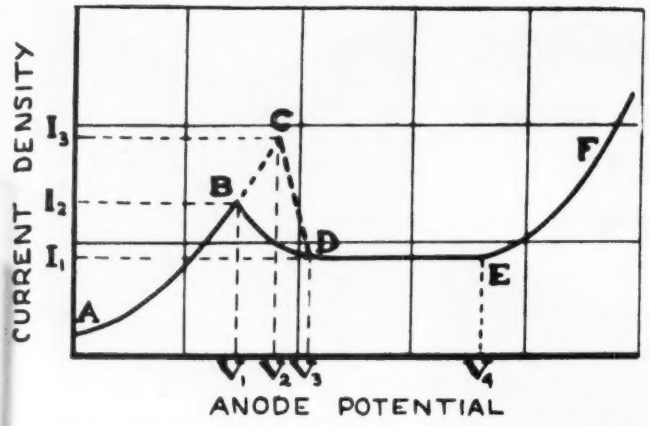

Fig. 5—Curves showing plat of current vs. anode potential in electropolishing as represented by Faust. *(Illustration courtesy The Electrochemical Society, New York, N. Y.)*

tween I_3 and I_1. Or, there will be periodicity with a different set of voltage-current ranges within the limits of the region, BCD. According to Faust, a third and different metal and electrolyte might have a curve entirely like the branch EF, with no polarization effects comparable to those producing conditions for BDEF or BCDEF, and with electropolishing taking place at a current above I_1 and a voltage above V_4.

* * *

Increased Temperature Accelerates Blister Failure In Water Immersion Tests

STUDIES recently conducted by Subcommittee VII of A.S.T.M. Committee D-1 on paint, varnish, lacquer, and related products have indicated that in water immersion testing of finishes on steel, there appears to be a definite relationship between time and degree of blistering of the paint coating, and the temperature at which the immersion test is conducted. Preliminary tests show that the rate of blistering is about doubled with each 10 degree rise in temperature. Although further work is indicated along this line to establish the reproducibility of the results and application to various types of finishes, these initial observations show that an operator testing organic finishes could secure results in a far shorter time by increasing the temperature of the water immersion testing bath.

The investigation was based on the use of water immersion test temperatures of 100 deg. F., 110 deg. F., and 120 deg. F., which were selected as being the most commonly used in the industry for testing organic finishes for blister failure. Types of finishes studied included an automotive finish of medium resistance and a refrigerator finish of high resistance. Steel panels 4 x 6 in. in size were used in the test. One set of panels was cleaned and finished with an automotive system using one dip coat of primer, baked 25 min. at 370 deg. F., followed by one dip coat of enamel, baked 45 min. at 250 deg. F. A second set of panels was cleaned, phosphate coated, and finished with a refrigerator system consisting of one dip coat of primer, baked 20 min. at 350 deg. F., followed by one dip coat of enamel, baked 30 min. at 280 deg. Fahrenheit.

The results of the water immersion tests conducted by experimenters at

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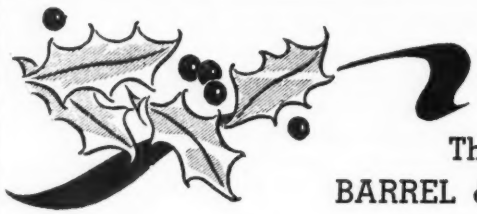
seven different test laboratories showed a definite relationship between extent of blistering and temperature of the water immersion. It was reported that the panels cleaned and coated with the automotive type finish system showed this relationship to a greater extent than those phosphate treated and followed by the refrigerator type finish. Considering panels of the former group, all of the cooperators in the test program reported little or no blistering after two weeks of exposure at 100 deg. F., and only one tester reported complete blistering with the automotive system at 100 deg. F. after four weeks of immersion testing. On the other hand most of the testers reported 100 per cent blistering after two weeks of exposure of this finish at 110 deg. F. and all but one so reported after three weeks. At 120 deg. F. complete blistering of the panels of the automotive type finish was reported by all but two cooperators after seven days of exposure. Also it was stated that in most cases the size of blisters increased with increasing temperature after any given length of exposure in the water immersion test. The A.S.T.M. experimenters pointed out, that while it is true that only two finishing systems were involved in this cooperative investigation, the results obtained appear very encouraging from the standpoint of speeding up this type of test for organic finishes.

Miller Chromium Anodes, their advantages, and specifications are the subject of a leaflet available from the J. C. Miller Co., 55 Mt. Vernon N.W., Grand Rapids, Michigan.

Catalog No. A230 listing 18 industrial infra-red heat lamps in clear, ruby, and sealed-beam silver types can be obtained from the Amplex Corp., 111 Water St., Brooklyn 1, New York.



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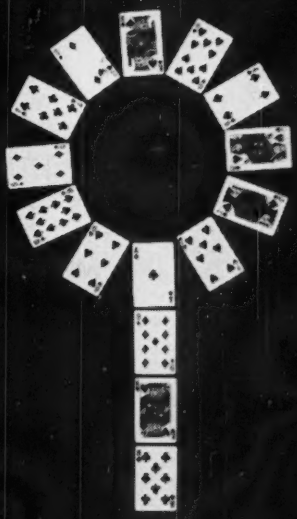

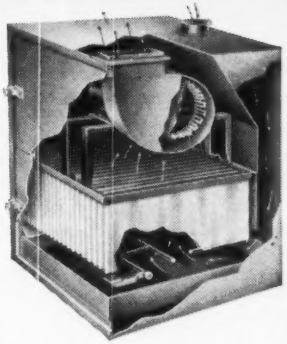

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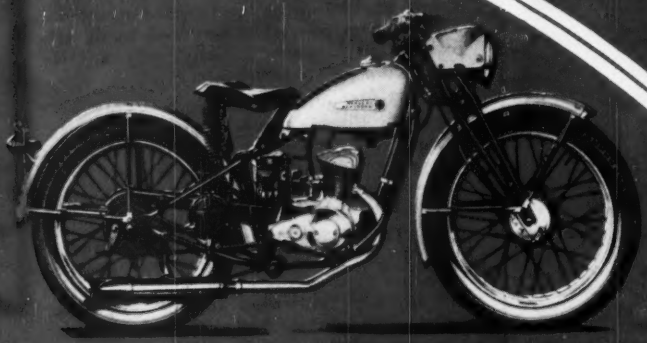
The Swivelier "Chromalite" Adjustable Lighting Fixture is polished and sprayed with an aluminum finish baked on with infra-red heat.

(Photo courtesy Swivelier Co., Inc., New York 3, N. Y.)



Two baked synthetic enamel coats over the Bonderized surface of this glistening 1950 model-125 lightweight motorcycle provide eye-appeal in the optional colors Brilliant Black, Sportsman's Yellow, Flight Red, and Riviera Blue. The muffler is Siliconed black, and the cylinder is aluminum Siliconed.
Chromium plated accessories and trim complete the pleasing appearance of the motorcycle.

(Photo courtesy Harley-Davidson Motor Co., Milwaukee 1, Wis.)

The sides and roof of the baggage and mail car shown here are aluminum sheets painted with Du Pont Duco in gray and blue. The three lines of molding are extruded aluminum which has been anodized by the Stolle Alumilite process. Lettering and numbering were done with Du Pont Duco aluminum, after which the entire car was given a coat of clear lacquer.

(Photo courtesy American Car and Foundry Co., New York 8, N. Y.)

White baked-on synthetic enamel combines with chromium plated trim strips and hardware to provide the pleasing exterior finish of the table top electric refrigerator illustrated here.

(Photo courtesy General Air Conditioning Corp., Los Angeles 23, Calif.)

PRACTICAL APPLICATIONS *of Modern Products*

Outstanding Production Methods and Ideal Working Conditions Embodied in New Plant

A NEW 13-acre, single story plant was dedicated last month by the A. B. Dick Company, manufacturer of duplicating equipment, at Niles, Illinois, 16 miles from the Chicago Loop. The plant, the office unit of which is illustrated in Fig. 1, was designed and constructed by The Austin Company of Cleveland and incorporates many principles inaugurated by this engi-

Fig. 1—This two-story office building which dominates the street approach to A. B. Dick Company's new 454,000 square foot suburban plant features a massive limestone, marble, and bronze entrance, which was created by Walter Dorwin Teague, the industrial designer who handles the styling of A. B. Dick products. Buff face brick and limestone trim have been used throughout the balance of the office building, which has alternate panels of green slate and aluminum sash that result in an interesting continuous band effect.
(Photo courtesy The Austin Company, engineers and builders)

neering and building firm.

The plant layout was planned after a complete survey had been made of production activities at the Dick Company's Chicago plant. Now, with 20 per cent less floor space, the company has more manufacturing and warehouse capacity than formerly.

It is the largest plant thus far completed to incorporate the simplified system of atmospheric controls which Austin has been introducing for employee comfort and production efficiency in a growing number of flat-roofed manufacturing plants. Its framework is composed entirely of 60-foot trusses, with columns spaced 40 feet apart, and employs the standard H-section welded designs evolved by Austin's research department to accommodate a variety of mechanical handling facilities and other loads.

The 454,000 square foot area in the plant proper has been planned to simplify materials handling and to reduce travel distance to a minimum. All materials are received, and all products are shipped, over one of three sidings or at the truck docks at the rear of the plant, where a tank farm, solvent building, oil storage warehouse, and the plant's boiler house—which also receive bulk materials by the carload—have been located along with a large cooling tower and an all-welded spherical 100,000 gallon water tower serving fire protection systems.

Since the plant's principal production operations fall into two major categories—the metal-working, finishing, and assembly operations required for the manufacture of duplicating machines, and the production of stencils, inks, and other supplies required for mimeograph operation—these activities have been integrated into separate layouts. Production from both activities is routed toward central warehousing and shipping areas.

Twenty-nine separate craneways and monorail systems, with capacities ranging up to ten tons, have been installed in the plant and reflect the special attention paid to mechanical

Fig. 2—This compact concentration of black oxide finishing tanks in the plating department illustrates the ease with which engineers of The Austin Company were able to accommodate materials handling equipment on the standard structural framework. The traveling monorail bridge in this area facilitates the handling of loaded tumbling baskets from bath to bath. All of the exhaust pipes serving the tanks on both sides of the aisle are vented through a single manifold with a power-driven exhaust fan on the roof, while fresh air is provided through a ventilating outlet directly above the bus duct. Note huge splash and drip-preventing drain pans in foreground. (*Photo courtesy The Austin Company, engineers and builders*)

handling problems, most of which have been met by suspending loads directly from the highly adaptable H-section trusses. A fleet of fork lift trucks, used for inter-departmental traffic, also utilizes the 14-foot clear height in areas provided for the storage of materials in process and finished products. In Fig. 2 is shown the compact concentration of black oxide finishing tanks in the plating department. Also shown is the method used for materials handling.

Employees in the plant are assured of uniform light and comfortable atmospheric conditions by means of the new Austin design for "better buildings". Artificial lighting is used exclusively throughout the plant with 7½ miles of fluorescent units being used to provide general illumination of at least 30 foot-candles in production and other occupied departments, and incandescent lamps which maintain 15 foot-candles being used in storage bays and similar areas. In Fig. 3 may be noted the excellent lighting conditions in the plating department.

Ventilation is controlled by means of 43 standard factory-built heating and ventilating units which have been mounted singly and in groups of two, three, and four on platforms which are fitted right into the standard building trusses. These units, each of which may handle 14,000 cubic feet of air per minute and have heating capacities up to 1½-million Btu's per hour, provide frequent air changes throughout the plant. While the units in the various departments have been designed to supply different amounts of outside and recirculated air in cold weather, depending upon departmental requirements, all are equipped to operate entirely with outside air, a factor which results in a reduction in temperature during warm weather. These facilities are supplemented in the summer by an evaporation cooling system, with cool water being sprayed across 11 acres of roof surface on the plant and office buildings in order to help maintain comfortable temperatures.

All of the dust, heat, and fumes created by the many metal-working and finishing operations necessary to the manufacture of duplicating machines are removed at the source, so that uniformly good atmospheric conditions may be maintained in these

Fig. 3—All of the plating and other metal surface treating operations on parts for mimeograph equipment are carried on in a concentrated 21,500 square foot area at one end of the A. B. Dick Company's new plant. This shows a small percentage of the plating tanks where employees work with maximum safety on self-draining open-planked floors, which are easy to maintain. Added safety features include contents labelling of the various chemical solutions. Bright finished metal parts on the conveyor in the background move toward the final finishing operations. (*Photo courtesy The Austin Company, engineers and builders*)

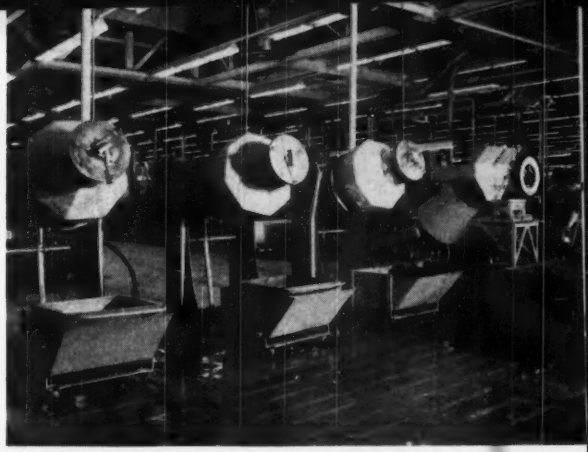


Fig. 5—A view of the barrel burnishing area of the A. B. Dick plant. Area is surrounded by drainage trough, and non-slip abrasive tile eliminates accident hazard produced by wet floor.
(Photo courtesy The Austin Company, engineers and builders)

departments without isolating the operations in separate rooms. As may be seen in Fig. 4, a large paint spray booth is located right out in a production area. Permanent partitions, however, are used to enclose the large stencil and ink manufacturing departments where the need for quality control has been met by full application of controlled-conditions principles which were also adopted in the offices and research laboratories.

A special non-slip abrasive tile floor, which may be seen in Fig. 5, is installed in the barrel-tumbling section of the plant and reflects the management's safety-mindedness. A drainage trough completely surrounds this and all other wet process areas in the plant. The abundance of service facilities is clearly indicated in this illustration which shows a portion of the extensive bus duct directly above the tumbling barrels and some of the dust removal and general ventilating ducts in the background.

Production of Water Heaters at the Westinghouse Sunnyvale Plant

A PRODUCTION goal of 60 units per day has been set for the production of electric water heaters which are now being manufactured at the Westinghouse Electric Corp. plant in Sunnyvale, California. A separate building is being used for the water heater operations and the latest developments in

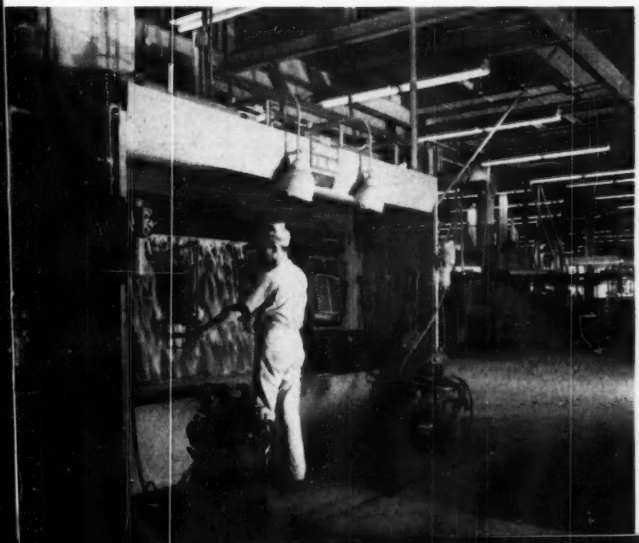


Fig. 4—Mimeograph parts are sprayed with paint as they pass through a water-wash spray booth on an overhead chain conveyor.
(Photo courtesy The Austin Company, engineers and builders)

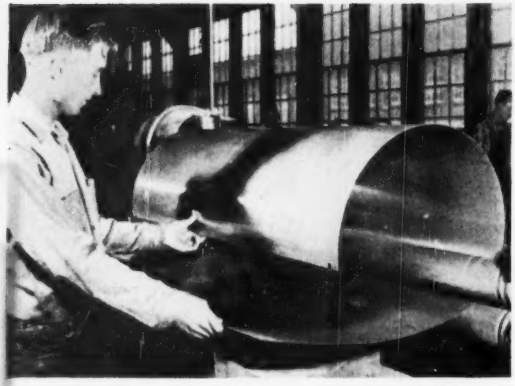


Fig. 1—An outer tank for a Westinghouse water heater is rolled into shape.

plant layout, planning, materials handling, machining, and assembly have been installed to assure optimum operating efficiency. The units are directed in a straight line through the plant with a minimum amount of hand work being required.

The water heater consists basically of two cylindrical tanks which are separated by a layer of insulation. As may be seen in Fig. 1, the outside tank is rolled into a circular shape on a three-roller press. The ends are fastened together with tie pieces, and these are then covered by metal sheets, which are riveted to the ties, in order to provide a neat appearance. The formed outer tanks are then given several finishing treatments which consist of Bonderizing in a conveyorized spray Bonderite setup, spraying with a light prime coat of high-bake alkyd urea-formaldehyde synthetic enamel, air drying for a short time, spraying again with the same material to provide a finish coat, and then baking in a conveyorized, circulating air, gas-fired oven at 260 deg. F. for approximately one hour. Fig. 2 shows a group of outer tanks which are being sprayed.

The inner tank is made of a corrosion-resistant galvanized steel, and in it are assembled the necessary heating elements, pipes, thermostats, and other items. The conveyor lines carrying the inner tank assemblies and the baked outer tanks converge; and an interesting method, which is known as "Operation Shoehorn", is used to slip the outer tank over the inner tank and around a three inch layer of spun glass insulation. The insulating material is first placed around the inside two halves of a cylindrical "shoehorn" which is initially in a horizontal position. The two halves are then raised simultaneously to a vertical position, and the insulating material is placed around an innner tank. The halves of the "shoehorn"

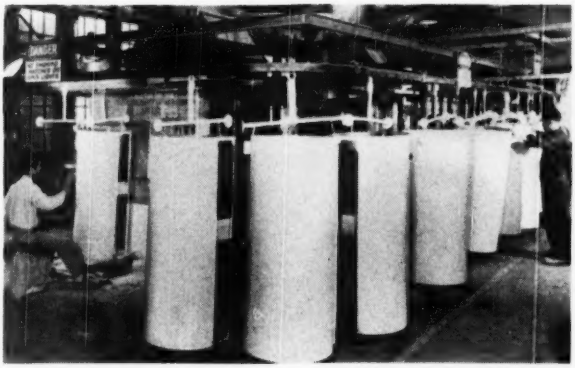
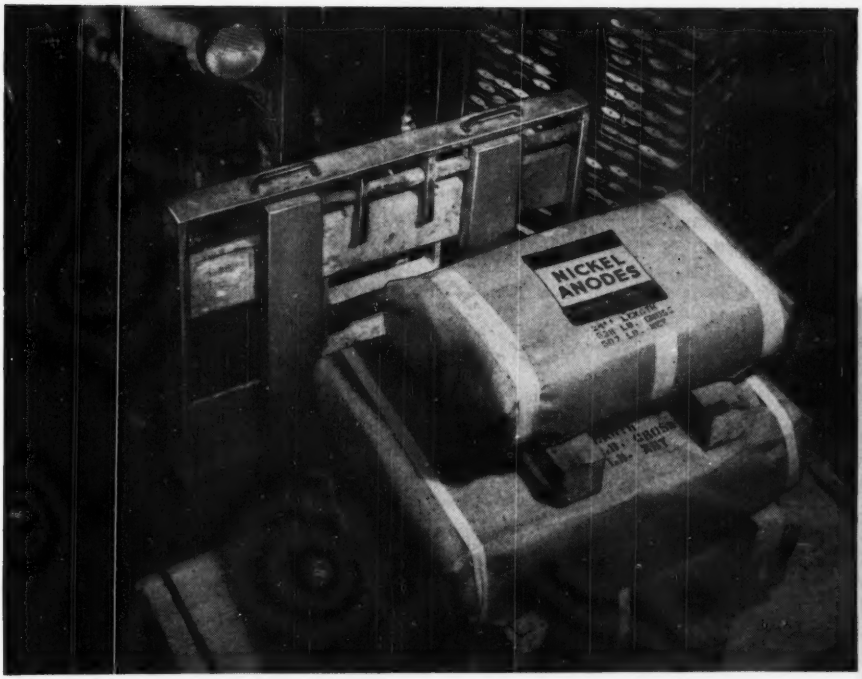


Fig. 2 — Outer tanks are sprayed with two coats of synthetic enamel as they are transported past a water-wash spray booth.



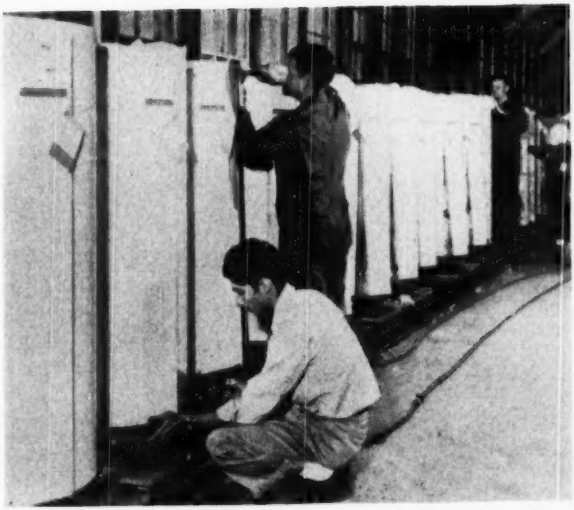
Harshaw Packaged Anodes

- easy to handle
- keeps anodes clean
- no return
- easy to open
- no deposit
- no extra cost

Harshaw anodes are now delivered in compact packages at no extra cost to the customer. The new Harshaw anode packages, which feature built-in skids, facilitate quick handling by mechanical or hand trucks. These anode packages stack easily and quickly. No container deposits or returns are necessary. Order your anodes from Harshaw. You will get a dependable product wrapped in a compact, protective package.

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

Fig. 3—A view of the final assembly line is shown here.



are then locked together temporarily, an outer tank is slipped over the "shoehorn", and then the "shoehorn" is withdrawn. This method of assembly eliminates the tedious job of hand packing the insulation.

The final production steps, some of which may be seen in Fig. 3, include the incorporation into the unit of the other necessary items—the top cover, front panel, sleeves, nameplates, and wiring; and, although these fastening jobs involve certain hand operations, work is speeded by the use of various power tools. After each unit is completed, it is given a thorough electrical test; and it is checked for conformity with specifications.

The stainproof porcelain enamel which is used on all steel plumbing fixtures was originally developed for use in certain commercial and industrial chemical processing operations, and it cannot be harmed by food acids, chemicals in household cleaners, or iron and other minerals which may be present in the water supply.

Nickel-plating was first developed on a commercial basis about 1870 in England.

South America and South Africa are the two largest importers of American-made porcelain enameled steel plumbing fixtures. Exporters of plumbing fixtures are reported favoring modern porcelain enameled steel fixtures because they weigh only one-third as much as other types and are easier to handle and ship.

FELT DOES IT BETTER

Paramount Brand

FELT WHEELS

Superior for Polishing and Buffing

When you order FELT WHEELS specify PARAMOUNT BRAND FELT WHEELS for top quality and uniformity.

BACON FELT CO. WINCHESTER, MASS.

Established 1824

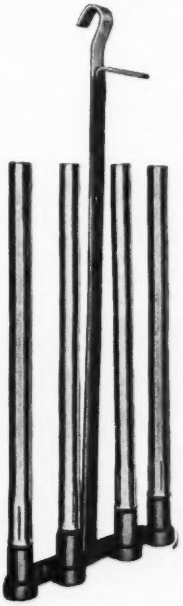
"America's Oldest Felt Manufacturer"

Send for our New Complete Catalog

NOW A SINGLE INSULATION FOR ALL RACKS

BUNATOL No. 1000 Paste insulation answers every rack insulation requirement. For insulating racks to reduce current loss, provide rack protection and produce more good work. This Plastisol insulation will give excellent service in the electro plating of all metals, electroforming, anodizing and electro etching. A single insulation handles all work.

No. 1000 Plastisol is a 100% solids paste and there is no loss from evaporation and no waste. Insulating racks is a simple operation requiring only a few hours to complete the entire job. That avoids down time and production delays. Any simple gas or electric oven can be used to bake the racks and give quick insulation service.



Paste insulation means all solids without inflammable and evaporating liquids. The baking converts the coating to a super tough thick skin that is not affected by plating chemicals and will stand hard use and abuse. Instead of rack insulation lasting a few weeks, paste insulation will stand for months which means economy in operation.

Any shop, regardless of size, where they are handling production work, needs Plastisol insulation. Write for complete information and find out just how little it will cost to handle your racks with BUNATOL No. 1000.

NELSON J. QUINN CO. . TOLEDO 7, OHIO

NEWS of the Industry

NEW PLANTS

A full line of house, industrial, and automobile paints will be produced at the plant to be constructed soon at Torrance, California by the **PITTSBURGH PLATE GLASS COMPANY.** Located about 15 miles from downtown Los Angeles, the plant will be erected on a triangular 15-acre site fronting on Crenshaw Boulevard.

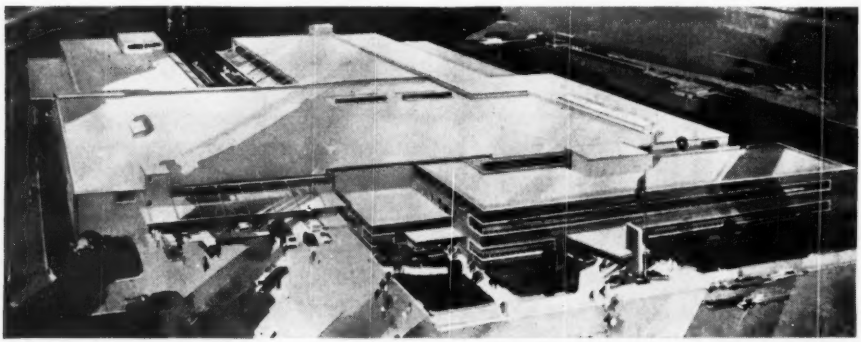
Modern locker and washroom facilities and a small cafeteria for employees are planned, and sufficient office space to house all normal plant operating requirements will be supplemented by facilities for the sales, accounting, and purchasing department personnel of the company's West Coast paint store organization.

The factory building will be of reinforced concrete with broad, continuous windows for improved day-lighting conditions, and the office building will be of brick construction.

M. J. Hoover, Eastern general manager of the **SIGMUND ULLMAN COMPANY,** division of **SUN CHEMICAL CORPORATION,** has announced that the laboratories and service station have been moved from the Bronx, New York, to spacious quarters in Long Island City. The move also includes the laboratories and service stations of two other Sun divisions under Mr. Hoover's jurisdiction, Eagle Printing Ink Company and the Frank H. Stevens Company.

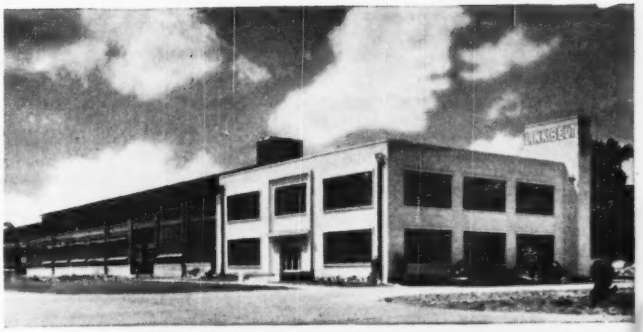
LINK-BELT COMPANY, manufacturer of chains, elevators, conveyors, and power transmitting machinery, has announced the formal opening of its modern, new manufacturing plant at 3203 South Wayside in Houston, Texas.

Built on a 10-acre plot of ground and comprising approximately 45,000 square feet of floor space, the new plant includes a one-story, all-steel factory building



Architect's conception of Pittsburgh Plate Glass Company's ultra-modern, $1,250,000 paint producing plant to be erected at Torrance, California.

New Link-Belt plant in Houston, Texas



with three bays and a two-story office section of masonry construction in front. The plant proper consists of a modern machine shop, structural steel shop, and large warehousing facilities.

Allan Craig, formerly located at the Link-Belt plant in Atlanta, is general manager of the company's Southwestern Division, with headquarters at the Houston plant.

COMPANIES

FIDELITY CHEMICAL PRODUCTS CORPORATION, manufacturer of industrial metal treating and cleaning compounds for all purposes, has moved to larger quarters at 470 Frelinghuysen Ave., Newark, New Jersey.

George N. Bick, president of the seven-year-old company, reports that the new plant's 15,000 square feet houses many facilities for research, testing, and production, including a pilot plating plant, various types of model spray booths, a special technical library, and greatly increased production facilities for all types of alkaline cleaners, spray booth compounds, paint strippers, and plastic peelable coatings.

THE PORTER-CABLE MACHINE COMPANY, Syracuse 8, N. Y., manufacturer of Speedmatic and Guild portable electric tools, has purchased the manufacturing rights and facilities of the Sterling Electric Tool Products Company for the production of the Sterling portable electric and pneumatic sanders, according to an announcement by DeAlton J. Ridings, president of the Porter-Cable Company.

The purchase of the rights and facilities of the Sterling Electric Tool Products Company makes the second business acquisition that Porter-Cable has made within the year. In the fall of 1948 the Unit Electric Tool Company of Syracuse was purchased. This organization's line of woodworking equipment has been added to the Porter-Cable line of Speedmatic tools.

The inventory, tools, and production facilities of Sterling Electric Tool Products Company will be moved to Syracuse where Porter-Cable will resume manufacture of the Sterling sanders under the direction of Lloyd B. Benham, vice president and factory manager.

Former members of Sterling's sales organization who have joined the Porter-Cable Company include John R. Perkins, Earl C. Wheless, Norbert B. Leydorf, Jerome J. Howe, Howard Smith, and Neil S. Rowe.

LaSALCO, INCORPORATED, St. Louis 4, Mo., manufacturer of electroplating and polishing equipment and supplies, has announced the appointment of Daniels Plating Barrel & Supply Co., 129 Oliver St., Newark 5, N. J., as distributor for its products in the northern part of New Jersey.

GUILD LABORATORY, P. O. Box 3194, Barnum Station, Bridgeport, Conn., electrochemical engineering consultants, has recently been established, according to an announcement by Victor H. Peretti.

Presently specializing in the preparation of nickel, silver, cadmium, and brass plating solutions and concentrates, the company will soon market a portable plating set known as the Guild Plate-Kit, which can be easily operated from a 110-volt a.c. power source.

Seen at cornerstone-laying ceremonies for the company's modern five-story structure, are (left to right) E. L. Wiegand, founder and chairman of the board, Edwin L. Wiegand Co.; A. P. Wiegand, senior vice president; B. A. Fleming, vice president in charge of sales; E. N. Calhoun, president, holding the eight millionth electric range unit produced.

A highlight of Pennsylvania Week activities in the Pittsburgh district was the laying of the cornerstone for a modern five-story structure by Edwin L. Wiegand, founder and chairman of the board of the **EDWIN L. WIEGAND COMPANY.** When completed, the building will add 73,000 square feet of space to the existing office, research, manufacturing, and warehousing facilities of the company.

Organized in 1917 to manufacture electric heating units, the company employed less than 100 men; now the company employs 1100 men in its plant and offices with 125 field engineers in key cities and is the world's largest manufacturer of electric heating units exclusively.

APOTHECARIES HALL CO., Waterbury, Conn., a unique mercantile and manufacturing concern, celebrated its hundredth anniversary Saturday, October 29, at a banquet at the Hotel Elton, Waterbury.

Founded in 1849 by a group of physicians and businessmen as a drug store, it was very soon selling glass, white lead, industrial chemicals, and fertilizers. The company at present has several major divisions, including wholesale and retail drugs and paints, a foundry, a heavy chemicals division, a well-staffed research laboratory, and a large plant engaged in the manufacture and distribution of fertilizers and insecticides. Products of the company's own manufacture also include industrial metal cleaners; institutional and dairy detergents; nickel, copper, brass, cadmium, and zinc anodes; buffing compositions; and numerous agricultural sundries.

The company has always maintained an enviable record of service in Waterbury, in Connecticut, and beyond. Two of the early officials of the company were mayors of the City of Waterbury, one a town clerk, and one, comptroller of the State of Connecticut. The two buildings which have been occupied by the company's retail outlet on the triangular piece of land facing Exchange Place in Waterbury have long been landmarks of the city. The original building was a colonnaded structure built in 1829. The seven-story "flat-iron" building constructed in 1893, now occupying the site, is still owned by the company. Warehouses and general offices are located on Benedict Street in Waterbury, and a nonferrous anode foundry on Manhan Street. The company's largest plant, the fertilizer factory, is located in the town of East Windsor, some 45 miles from Waterbury, in the heart of the tobacco-growing section in the Connecticut River Valley.

Noteworthy in the company's history is its relationship with the employees and the extraordinary length of service of many key people. The three senior officers, Isaac P. Kellogg, chairman of the board, Evan H. Jones, president, and Levi Wilcox, secretary, have a total of 151 years of service with the company. Twenty-two employees received service emblems at the anniversary banquet, indicating individual length of service of over 25 years. The company instituted one of the first non-contributory group

insurance policies over a generation ago. A liberal pension plan went into effect October 1, 1947, which recognizes the years of past service of the employees.

In keeping with the company's traditions, the celebration was a quiet family affair with only the mayor, two clergymen, and some 250 employees and spouses in attendance. As it begins its second century, despite its years and the lengths of service of its employees, the company still displays the same vigor, aggressiveness, and enthusiasm that marked the infant enterprise in 1849.

The **FEDERATED METALS DIVISION** of the **AMERICAN SMELTING AND REFINING COMPANY** has expanded its business in electroplaters' anodes through the acquisition of the production facilities of the Metallurgical Products Co., Philadelphia, Pennsylvania.

Anodes of all types will be merchandised through 24 sales offices across the country, according to E. L. Newhouse, Jr., Smelting Company vice president in charge of the Federated Metals Division. Production will be concentrated at the Division's Perth Amboy, New Jersey plant under the management of R. D. Taylor. The technical staff of Federated will be assisted by I. W. Wilenchik of the Metallurgical Products Company.

ALLIED RESEARCH PRODUCTS, INC., Baltimore Md., manufacturer of Iridite finishes, has purchased the building at 4004 E. Monument Street, which has housed the company for the past three years.

Plans are being drawn up for extensive renovation of the interior, which will include larger research laboratory facilities, expanded manufacturing facilities for new Iridite products, and additional space for the company's metal surface treating operations. New offices for the administrative and sales staffs will also be erected.

Four representatives have been added in the Midwest by the Platecoil Division of the **KOLD-HOLD MANUFACTURING CO.**, Lansing, Mich. They are as follows:

The Henry P. Thompson Co., Cincinnati, specialist in heat exchange equipment, power plant engineering, feed water treatment, and flow control of water since 1920. Herbert H. Haas, a chemical engineer, is president of the company, and he is assisted by John S. Bower, mechanical engineer, and Kenneth C. Mathews, chemical engineer.

The Power Plant Efficiency Co., Indianapolis, will handle Platecoil in that area. The company has a background of 28 years' experience in the field.

Patton Equipment Co., Inc., St. Louis, under the supervision of Russell and John Patton and a staff of seven, will cover southern Illinois, Missouri, and parts of Arkansas.

W. P. Nevins Company is a steam and mechanical specialties organization representing the company in the Chicago area.

In the East four new representatives have been appointed to help manufacturers with their industrial heating problems. They will provide engineering assistance in connection with the new Platecoil Method of tank heating. The new representatives are as follows: The **PAUL B. HUYETTE COMPANY, INC.**, Philadelphia; **H. R. HOUGHTON COMPANY**, Baltimore; **W. B. PARSONS COMPANY**, Boston; and the **GERALD B. DUFF COMPANY**, Newark, New Jersey.

HOLLAND SAYS:
START SAVING BY INCREASING PRODUCTION
Spray Booth — Leg and Floor Type. Available in all sizes.
Write for FREE folder "M" showing our wide selection of metal finishing equipment.
J. HOLLAND & SONS, INC.
MANUFACTURERS • DEALERS
276 SOUTH NINTH ST. • BROOKLYN, N. Y.

NEW POSITIONS

According to an announcement by A. S. Ault, manager of sales and services, Chicago Vitreous Enamel Product Co.,

Wesley L. Dinsmore, William L. Donaldson

Cicero 50, Ill., **WESLEY L. DINSMORE** and **WILLIAM L. DONALDSON** have been appointed district managers.

Mr. Dinsmore, who has been a service engineer in the Eastern territory, has been appointed district manager of the New England territory. A graduate of Bates College and formerly employed at General Electric Company, he joined Chicago Vit in 1947.

Mr. Donaldson has been named district manager of the East Central States. He joined the company as a service engineer in the Ohio territory in June, 1947. Formerly ceramic engineer at the Roper Corporation, he is a member of the American Ceramic Society, American Society for Metals, and Enamelers Clubs.

Dr. Emil Ott, director of research, and Dr. Raymond F. Schultz, director of the Experiment Station, have announced the following appointments at the Hercules Powder Co., Wilmington, Del.:

DR. PETER VAN WYCK, formerly technical assistant in the Research Department, becomes assistant director of the Experiment Station, responsible for the work done by the Cellulose Products, Explosives, and Virginia Cellulose research divisions.

DR. RICHARD S. GEORGE, former manager of the Naval Stores Research Division, will be assistant director of the Experiment Station, responsible for the work done by the Naval Stores, Paper Makers Chemical, and Synthetics research divisions. **DR. REGINALD W. IVETT** succeeds Dr. George as manager of the Naval Stores Research Division.

Also announced were the transfers from the home office to the Experiment Station research staff of **EDMUND WINTERBOTTOM,** who was appointed administrative assistant to Dr. Schultz, and **DR. JOHN T. HAYS,** appointed special assistant in the Scouting Research Division.

Two appointments in the sales force of Hercules Powder Company's Cellulose Products Department have been announced by Carl W. Eurenius, department director of sales.

FRED K. SHANKWEILER, who has been manager of the New York office of Cellulose Products for the past two years, has been transferred to Wilmington, where he will be supervisor of chlorinated products.

JAMES R. YEAGER has been named to succeed Mr. Shankweiler in New York. For the past five years Mr. Yeager has been lacquer marketing supervisor in the home office at Wilmington, Delaware.

BRUCE A. FLEMING, vice president in charge of sales of the Edwin L. Wiegand Co., Pittsburgh, was elected to the board of directors at their annual meeting on Friday, October 15. Mr. Fleming joined the company in 1940 as assistant to the president.

Wilfred S. McKeon, president of Sulphur Products Company, has announced the appointment of **SAMUEL J. STABILE** as secretary-treasurer. He will have charge of the affairs of the company at the main office, Greensburg, Pennsylvania.

A graduate of St. Vincent College, Mr. Stabile received his B.S. degree in business administration in 1948.

Samuel J. Stabile

R. C. Trow, manager, has announced that **N. L. WATKINS** has joined the the Almco Division of Queen Stove Works, Inc., Albert Lea, Minn., as chief development engineer. In addition to his duties at the home office, he will furnish processing formulas and other technical advice to users of Almco equipment.

N. L. Watkins

Well-known as a technical expert on advanced barrel finishing, Mr. Watkins formerly was associated with Carl L. Norden, Inc., Remington Rand Corporation, and the Westinghouse Electric Corporation where he served as manufacturing engineer.

JOHN A. STIERSTORFER has been appointed senior synthetic enamel chemist at the Stamford, Connecticut branch of the Atlas Powder Company's Industrial Finishes Department.

A graduate of Pratt Institute, Brooklyn, N. Y., Mr. Steirstorfer brings to Atlas a background of a dozen years in the development laboratories of Eastern and Midwestern finish and paint manufacturers.

John G. Benjamin

The appointment of **JOHN G. BENJAMIN** as sales manager of The Abbott Ball Company, Hartford 10, Connecticut, has just been announced by R. M. Terry, executive vice president. He will succeed J. T. Taylor who has resigned.

Mr. Benjamin will be in charge of sales for both the Bearing Ball and Burnishing Divisions.

The appointment of **GEORGE R. LUNDBERG** as director of advertising and sales promotion has been announced by The Osborn Manufacturing Co., Cleveland, Ohio, manufacturer of industrial brushes.

Formerly chief accountant, Mr. Lundberg has been associated with Osborn in various capacities for the past 17 years. He is a member of the University Circle Kiwanis Club, Industrial Marketers of Cleveland, and Cleveland Ad Club.

George R. Lundberg

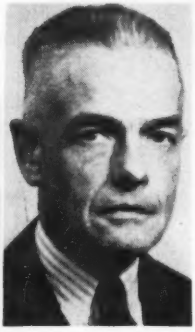
CHARLES KEMEN has been appointed sales and service engineer representing Klem Chemicals, Inc., Dearborn, Mich., in the Milwaukee area.

A graduate chemical engineer of the University of Detroit with experience in metal cleaning and processing, Mr. Kemen will devote his entire time to chemical processing problems and servicing of Klem products. He is located at 312 Wisconsin Avenue, Suite 207, Milwaukee, Wisconsin.

Optimus Equipment Company, Matawan, New Jersey, manufacturer of vapor degreasers, metal parts washers, pickling and drying equipment, has announced the appointment of **MELVILLE MORRIS** as president. Mr. Morris has been executive vice president of the company, which is a subsidiary of Hanson-Van Winkle - Munning Company, also of Matawan. The appointment follows in line with plans for enlarged operations contemplated at this time.

Melville Morris

CLAYTON P. YODER has been appointed sales manager of the Platecoil Division of the Kold-Hold Manufacturing Company, according to an announcement by J. R. Tranter, president. His activities will include establishing sales representatives in the leading industrial areas of the country, and he will have charge of training personnel and general promotion of the products of the Platecoil Division.



Clayton P. Yoder

Mr. Yoder is an associate member of the American Institute of Electrical Engineers and a member of the American Society for Metals and the Electric Association of Niagara Frontier. He has made a number of contributions to electrical magazines and is a widely-known authority on industrial electric heating.

EARL ERICH, a recent graduate of Muhlenberg College, has accepted a position in the Research Labortories of The Atlas Mineral Products Co. at Mertztown, Pennsylvania.

J. T. Murnane

Appointment of **J. T. MURNANE** as industrial sales manager for Pittsburgh Plate Glass Company's paint division at Newark, New Jersey has been announced recently by the firm.

Associated with Pittsburgh's paint division since 1925, Mr. Murnane has represented the firm in the Baltimore district until his present appointment.

As industrial sales manager Mr. Murnane succeeds the late C. R. Roebuck who served in the position for a period of 24 years.

Stockholders of Detrex Corp., Detroit 32, Mich., have elected **ROBERT LINDLEY MURRAY** as a director of the corporation. A chemical engineer with degrees from Stanford University and recognized as an outstanding authority in the chlorine and alkali industry, Mr. Murray is the author of many technical papers and has received medals for his work in the chemical and engineering fields.

Robert Lindley Murray

Mr. Murray is also executive vice president and a director of the Hooker Electrochemical Co., Niagara Falls, N. Y.; vice president and director of Hooker-Detrex Inc., a jointly-owned subsidiary of the Hooker and Detrex companies; and a director of the Power City Trust Company of Niagara Falls.

TRAINING COURSES

All those interested in ceramic finishing are invited by the **BINKS MANUFACTURING COMPANY** to attend a special one-week course on porcelain enamel spray finishing, beginning February 6. Instructors will include authorities in both ceramics and ceramic finishing equipment. Arrangements have been made with the Ferro Enamel Company to have one of its experts, E. E. Bryant, on hand to answer questions on porcelain enamel and porcelain enamel shop procedures.

Processses, problems, and methods leading to economies and improvements in finishing will be discussed, in addition to instruction in the design and operation of the latest spray equipment in the ceramic field.

The classes will be conducted without charge. Applications should be mailed at once to E. F. Watts, Binks Manufacturing Co., 3122 Carroll Ave., Chicago 12, Illinois.

MEETINGS

The **NEWARK BRANCH** of the **A.E.S.** announces that its Annual Open Meeting will be held Saturday, December 17, at the Hotel Robert Treat, Newark, New Jersey, beginning at 2 p. m.

The educational program will consist of the following papers: "Factors That Influence the Operating Characteristics of Chromium Plating Baths," by J. B. Winters, R. O. Hull, & Co., "Deposition of Metals on Aluminum by Immersion, from Solutions Containing Fluorides," by S. Heiman, Philadelphia Rustproof Company; and "Metal Finishing Research," by E. T. Candee, The Lea Manufacturing Company.

The Annual Meeting of the **CHICAGO BRANCH** of the **A.E.S.** is planned for January 14 at 2:00 p. m. at the Stevens Hotel.

Speakers and their subjects are as follows: Dr. William Blum, National Bureau of Standards, "New Directions for Research in Electroplating"; R. O. Hull, R. O. Hull & Co., Inc., "Factors Affecting Throwing Power"; and Dr. B. B. Knapp, International Nickel Company Inc., "New Developments in Nickel Plating."

Following the educational session, a banquet will be held in the main ball room starting at 7 p. m. Tickets at $7.50 each may be obtained from the committee directed by Rudy Hazucha.

SOCIETIES

At its 18th Annual Meeting held at French Lick, Indiana, on October 27 and 28, the Porcelain Enamel Institute elected **F. L. MEACHAM** as president.

Vice president and general manager of the Chicago Vitreous Enamel Product Company, Mr. Meacham is a graduate of Case Institute of Technology with a B.S. degree in metallurgical engineering; a member of the honorary research society of Sigma Xi; was a research chemist and metallurgical assistant at Armco Steel Corporation, Midddletown, Ohio, in which capacity he did a great deal of pioneer and development work on the preparation of sheet metal for porcelain enameling; and spent 16 years with the Frigidaire Division of General Motors Corporation.

At the annual meeting of the **ASSOCIATION OF CONSULTING CHEMISTS AND CHEMICAL ENGINEERS, INC.**, held in New York, October 25, election of the new officers and councilors was announced as follows:

President (re-elected), Percy E. Landolt; vice president, Stephen Laufer; treasurer, Robert S. Aries; and secretary, Albert Parsons Sachs. Councilors are Charles Davidoff, Erwin DiCyan, Chester L. Knowles, Harry A. Kuhn, A. Rosseboom, Nicholas M. Molnar, Robert H. Bell, Carl Bussow, H. W. Dippel, Jacques Errera, C. E. P. Jeffreys, Werner Kreidl, Helman Rosenthal, Herbert R. Simonds, Raymond Stevens, and A. Taub.

THE PAINT & VARNISH EXCHANGE CLUB, INC., recently held a meeting at its headquarters, 120 Liberty Street, New York 6, N. Y., the first since its adjournment during World War II. Arrangements have been made by the program committee for future meetings.

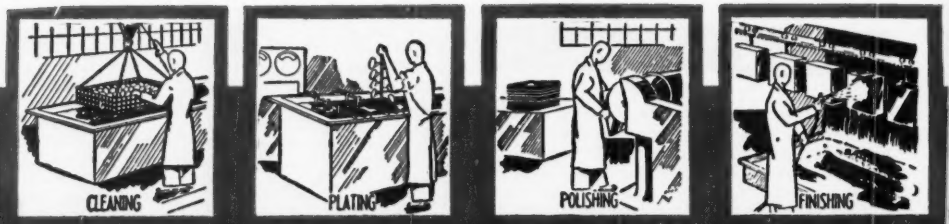
Through their joint Educational Committee the **PHILADELPHIA PAINT, VARNISH AND LACQUER ASSOCIATION** and **PHILADELPHIA PAINT AND VARNISH PRODUCTION CLUB** established a course in paint technology at Saint Joseph's College, Philadelphia, Pennsylvania.

Under the direction of Dr. William T. Pearce, the course consisted of 30 two-hour lectures once a week, and was attended by 59 men from various paint and varnish companies, 16 from related industries, and 13 senior chemistry students. The course covered the study of pigments, oils, resins, driers, and thinners, and their formulation in paints, varnishes, lacquers, and industrial finishes. Lectures on shading, testing, surface preparation and application, as well as plant design and operation, were given.

NECROLOGY

ALBERT J. LAFORET, salesman for Buckingham Products Co., Detroit, died suddenly on October 17. He had been with the company for more than 12 years, covering the Michigan territory.

Mr. Laforet is survived by his widow and two sons.

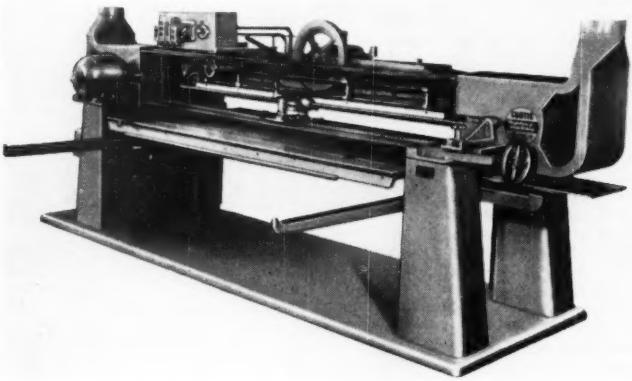


New • EQUIPMENT • MATERIALS • PROCESSES

Curtis 43R1-DB Double Belt Hydraulic Stroke Sander

The Curtis 43R1-DB Double-Belt Hydraulic Stroke Sander is a heavy-duty, super-speed production polishing and sanding machine, product of the Curtis Machine Division, Lincoln Park Industries, Inc., Jamestown, N. J. The speed of the double, hydraulic-driven head is variable up to 250 strokes per minute. A non-stop stroke adjustment feature permits automatic adjustment of the stroke lengths from 16 inches to 8 feet without stopping the machine, thus enabling the operator to accommodate the stroke to the work without interruption.

The two belts of the unit, each driven by its own motor, are independently reversible and may be used interchangeably without stopping the machine or removing the work from the table, permitting rough and finishing operations in one setup. All operational controls are grouped on a compact panel within easy reach of the operator.



Curtis 43R1-DB Double-Belt Hydraulic Stroke Sander

Homopolar Generator

The Carnegie Institute of Technology will soon have in operation new scientific facilities for probing more deeply the secrets of nuclear physics. The Electric Products Company, 1741 Clarkstone Rd., Cleveland 12, Ohio, a specialty electric equipment manufacturing concern, has aided this program by building a Homopolar Generator for the Institute. The generator, rated at 400 kilowatts, will be used to supply d.c. power for the magnets of the Synchro-Cyclotron. Although much of the equipment for the Carnegie Institute of Technology nuclear research program involves new special devel-

opments, The Electric Products Company's Homopolar Generator is noteworthy because of the huge potential use in the electrolytic industry.

Recent developments in electrolytic processes throughout industry have created a need for tremendous quantities of low-voltage, d.c. power. The Homopolar Generator may offer the only practical and economical means of producing tens or hundreds of thousands of amperes at a few volts. Recent inquiries from the electrolytic industry have indicated the need for equipment capable of supplying low-voltage d.c. power in quantities of 50,000, 100,000 and 1,000,000 amperes from a single source.

The Homopolar Generator is capable of delivering 21,000 amperes at 18.7 volts. Very little change in the Homopolar Generator size and design would enable this machine to deliver 100,000 or more amperes at low voltage for use in electrolytic processes such as electrotinning, electroplating, electropolishing, electrogalvanizing, and so on. The size of a Homopolar Generator is proportional more to the voltage developed than to its current capacity.

Basically the homopolar design, improved and patented by J. V. Caputo and manufactured by The Electric Products Company, incorporates four features that make this design commercially practical. They are: (1) Caputo compensation, (2) vertical design, (3) magnetic lift, (4) water-cooling.

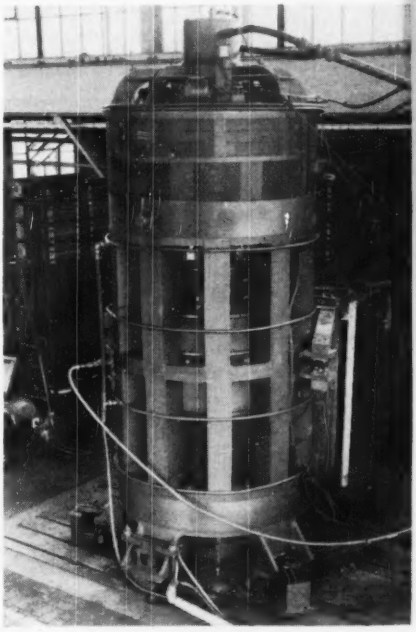
Compensation by the Caputo method maintains constant reluctance in the total magnetic circuit. It is effected by bringing the brush leads out to pole-face conductors which pass through the stator laminations to the terminals. The load current in these conductors is opposite in direction to the current in the armature conductors. The armature conductors are located close to the air gap and directly opposite the pole-face conductors. Caputo's method eliminates: (1) magnetic coupling to the main air gap, (2) voltage unbalance, and (3) internal circulating current. The net result is minimum armature reaction and good voltage regulation.

Vertical design permits easy accessibility for routine preventive maintenance and saves floor space. The water-cooling system of the generator performs more satisfactorily with a vertically designed machine than with one of horizontal design.

The thrust load on the bottom bearing is minimized by the use of magnetic lift, a new concept of engineering. Part of the field flux of the bottom generator unit is allowed to leak into the lifting ring mounted on the rotor, and thence to the rotor. This flux produces a lifting force to counterbalance thrust due to the weight of the rotor.

The brushes and collector rings are water-cooled because of the heavy current carried. Made of copper graphite powder, the brushes are molded with integral water-cooling tubes. The collector rings are cooled by water introduced by a dip tube in the hollow shaft. Incoming water flows up around the dip tube until it encounters radial holes that lead to the lower portion of the annular cooling cavity under the lower collector ring. Similar radial holes connect the upper portion of this cavity with the center hole. Because water rises when it is warm, the water in the cavity is forced inward through the upper radial holes by the incoming cool water. The same process takes place in the upper collector ring. From this point, the warm water is discharged by being thrown by a slinger ring or disc located at the top of the shaft into a collector and thence into the drain.

Through water-cooling the brushes and



Homopolar Generator

rings, the problem of dissipating heat is solved. This results in better performance, lengthens brush life, and minimizes collector ring maintenance.

The Homopolar Generator should bring to industry another source of low-voltage, high-current power with these advantages: (1) a source of pure direct-current power; (2) more amperes per square foot of floor space; (3) lower first cost; (4) less operating cost; (5) reduced maintenance.

Unichrome SRHS Chromium

Developed by United Chromium, Inc., 51 E. 42nd St., New York 17, N. Y., a new self-regulating high speed chromium plating solution has been made available to the plating industry. Advantages claimed for the new solution include self-regulation, higher cathode efficiency, improved covering power, wider bright plate range, reduced sensitivity to current interruptions, and less tendency to produce "rainbow plate" when plated over nickel.

The Unichrome SRHS solution is made up and maintained with but a single salt, Unichrome Compound CR-100. The only

Fig. 1—Hard-to-cover lock hardware are typical parts being plated more easily and with fewer rejects in the Unichrome SRHS Chromium Plating Solution.

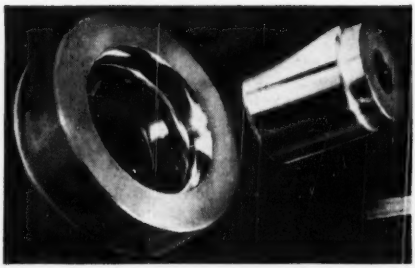
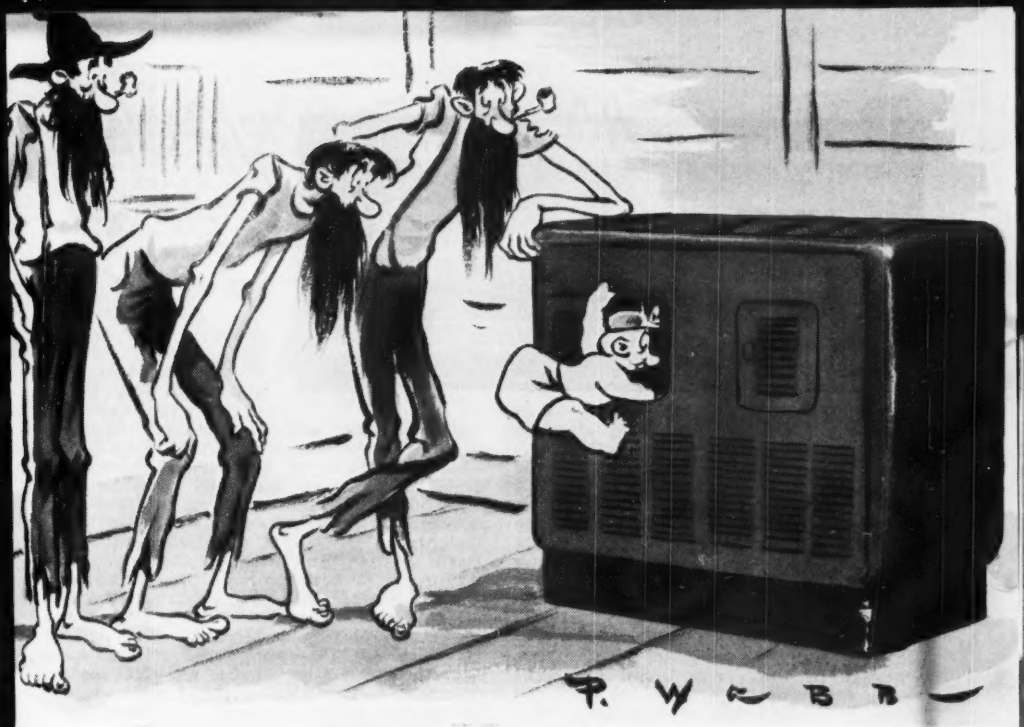


Fig. 2—Dies and plugs, such as shown above, mandrels, gages, bushings, and many other parts are plated 30 to 50 per cent faster in the SRHS Solution than in the conventional solution.

regular solution maintenance required is the addition of Unichrome SRHS compound to adjust the concentration of the solution to the desired Baumé. The acid catalyst radical concentration is automatically self-regulated. Therefore, the solution is always in good plating balance. This self-regulating feature of the bath is said to eliminate the necessity for chemical analysis in maintaining the correct plating balance.

The cathode efficiencies of Unichrome SRHS Chromium Bath are substantially higher than those of a conventional chromium plating solution. As a result, deposits of equal thickness are claimed to be obtained in less time than with the conventional solution. For example, when plating at 1 or 2 amperes per square inch at 110 deg. F. in a 31 deg. Baumé Unichrome SRHS Bath, cathode efficiencies are 50 per cent greater than those of the conventional solution of the same concentration operated under identical conditions. Under these conditions decorative plating done in a SRHS Bath will require about ⅓ less time. Moreover, the manufacturer states that since the SRHS Bath permits the use of higher current densities than does the conventional solution under the same conditions of concentration and temperature, it is possible to shorten still further the plating time, if desired. Conversely, the SRHS Bath makes it possible to obtain a substantially thicker deposit than could be obtained in the same plating time in the conventional bath, and the importance of this is particularly noteworthy in hard chromium plating.

According to the manufacturer, the SRHS Bath has better covering power than a conventional chromium solution. Where parts that are difficult to cover



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You just can't beat the new *VEDOC* Combustion Chamber Black for space heaters. More and more manufacturers are finding that this pigment sticks to the metal and stays black at temperatures to 1000 degrees. This finish protects the chamber from rusting . . . and continues this protection after the binder has been destroyed by high temperatures. Yet, when the heater is put into service, the fumes are at an absolute minimum. *VEDOC* Combustion Chamber Black air-dries in 10 to 15 minutes. It can be baked at high or low temperatures. May we send you a sample order and quotation for your requirements? You'll find the cost is low enough to make this a practical application on all modern heaters.

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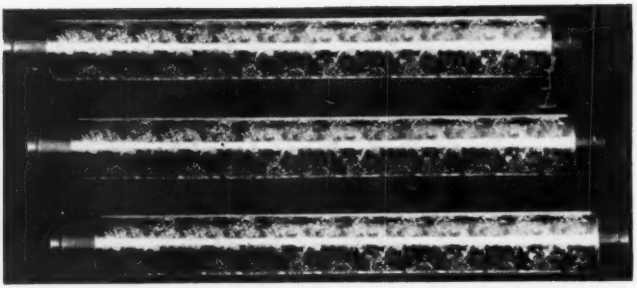

Fig. 3—Gravure rolls and printing plates can be plated with a minimum of rejects because the SRHS Solution is always in good plating balance as a result of its self-regulating feature.

are being chromium plated, this feature of the SRHS solution may eliminate the necessity for expensive auxiliary anodes which would be required if a conventional solution were used.

Unichrome SRHS Bath is said to have a considerably wider bright plate range than the conventional chromium plating solution. In a recent test where bright decorative plating was required on an automobile hood ornament, it was found that the bright plate range in the SRHS Bath extended from 75 to 190 amperes, whereas in the conventional bath the range was only from 90 to 150 amperes. Thus, in plating this hood ornament the bright plate range of the SRHS Bath was nearly twice as great as that of the contional solution.

The wider bright plate range of the SRHS Bath allows the plater to use higher current density without the danger of chromium burning in the high current density areas. The wider bright plate range also makes it possible to obtain good coverage at low densities, a feature which will be of particular interest to companies which plate pieces that are irregular in shape.

In addition to these features, there are others which tend to minimize rejects and make it possible to produce consistently high quality plating. A common cause of rejects is gray chromium, caused by plating over passive nickel. The SRHS Bath has been found to have more activating action than the conventional bath on bright nickel and, as a result, this type of gray chromium will seldom be obtained from the SRHS Bath. Another type of gray chromium is caused by interruptions of current during the plating process. As the SRHS Bath is less sensitive to interruptions of current than the conventional chromium plating solution, it is less likely to produce rejects. Rejects due to rainbowing are minimized because the new bath, unlike the conventional chromium solution, has little or no tendency to produce rainbow plate at the edge of a chromium deposit plated over nickel.

The physical and chemical properties of the deposit obtained with the SRHS Bath are said to be the same as those of deposits from a conventional solution.

Standard chromium plating equipment is generally satisfactory for use with the Unichrome SRHS Chromium Plating Bath. A steel tank with a suitable plastic lining is preferable, although both lead alloy-lined and ceramic-lined tanks may be used. Thorough rinsing prior to chromium plating is recommended, and facilities for this should be available. Standard lead alloy anodes are also recommended. The usual type of generator or rectifier is satisfactory, but because of the higher current efficiency of the SRHS, the total generator or rectifier capacity required may be less than if the standard bath is used.

"Burnish-All"

Chemclean Products Corp., 64 Sixth Ave., New York 13, N. Y., announces the development of "Burnish-All," which has the outstanding advantage that it can be used on a variety of metals.

Burnish-All is claimed to provide a brilliant luster on most metals and their alloys in less time than is usually required. It is also said to be equally effective when used either with burnishing medium or in self-rolling operations.

Midget Dust Collector

Identified as the "Dustkop" Model 331D, a midget dust collecting system for laboratory, small-wheel grinding, buffing, polishing, and other operations has been placed on the market by the Aget-Detroit Co., Ann Arbor, Mich. Rated in excess

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Korb-Pettit Spiral Woven Wire Conveyor Belts are fabricated in suitable metals and mesh sizes for baking, conditioning, heat treating, material-handling, processing and washing. Particularly well adapted to conditions where drainage and the free circulation of air are required. K-P Flextrough Belts with flanged edges prevent the escape of small parts. Side chains can be provided for sprocket drive.

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Consult with the K-P district sales office or write direct. Korb-Pettit Wire Fabrics and Iron Works Inc., 1509 North Mascher Street, Philadelphia 22, Pa.

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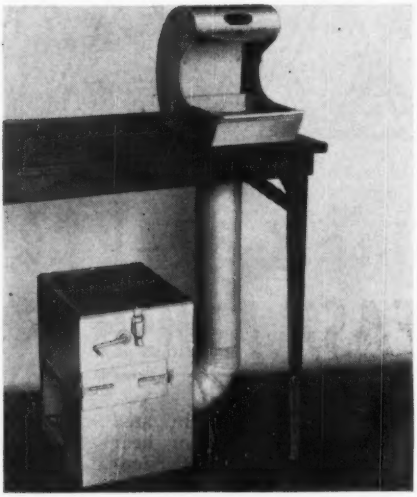
"Keeps Promises"

Wire mesh, Spiral Woven Wire Conveyor Belts, Infra-Red Conveyor Dryers, Leather Finishing and Drying Machines, Complete Special Purpose Conveyors designed and Manufactured to Order.



Dustkop Model 331D Dust Collector

of 300 c.f.m., the unit is especially designed for installation where space is extremely limited and is supplied complete with a bench-top hood, sheet metal pipe, and elbows for quick and easy installation.

Suction is supplied by a paddle-wheel fan, direct-driven by a ¼ h.p. continuous duty motor. A special dust separator, together with a non-flammable spunglass filter, provides a two-stage means of cleaning the air of its dust before returning it to the working area. A hand crank on the side of the unit allows for a periodic shake-down of the filter, which can be easily and economically renewed when necessary. The collected dust is removed by means of a handy cleanout tray.

The hood provided with the dust collector has a socket for a light bulb. Two removable trays, one for wet and the other for dry grinding, are also supplied. The hood, connecting pipe, and dust collector are finished in gray-green enamel, the entire unit being completely fabricated of heavy gauge steel.

Aluminum-on-Steel Bonding

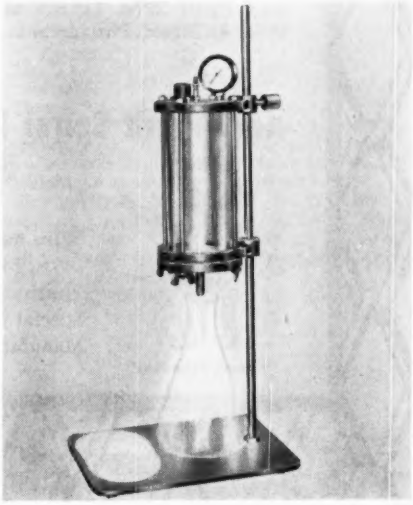
Patent 2,484,118 has been issued to Richard S. Reynolds, president of the Reynolds Metals Co., Richmond, Va., which covers a process for aluminum-on-steel bonding for protection against corrosion.

In the new method two strips of aluminum foil are applied to the top and bottom of the steel sheet. A fine iron coating is then applied to the steel first by an electrolyte process to provide a permanent bond between the steel and aluminum surfaces.

The mill setup for handling the application of this coating involves, in a single, continuous process, passing steel strip from a coil through a cleansing bath, an electrolytic bath where it receives the iron coating, a furnace to heat it to about 850 deg. F., and then passing it between two strips of aluminum foil which are bonded to the steel by high pressure rolling. The aluminum-covered steel can then be further rolled to reduce its thickness as desired.

Model No. 10 Laboratory Filter

The Ertel Engineering Corp., 40 Front St., Kingston 3, N. Y., has announced its Model No. 10 Laboratory Filter, which is precision constructed in stainless steel, hard rubber, or brass (nickel or silver plated). It has a capacity of 1.3 liters; its filtering surface is 9.62 square inches; and its filter disk diam-



Model No. 10 Laboratory Filter

Krouse Magnifying Micrometer in use

eter is 4⅛ inches.

One of the features of the Model 10 is its ability to accommodate any type filter medium, thus permitting easy refilling without disassembling. It is 27 inches high overall, and a simple thumbscrew adjustment permits raising or lowering the filter to fit vessels of various heights.

To allow full view of the product during the filtering process, a 45-ounce capacity glass cylinder is furnished. The filter is equipped with a pressure gage for 0-60 p.s.i. Asbestos filter sheets are available if desired.

Glov-Cote

Glov-Cote, a protective hand and arm cream for shop use, designed to protect skin against paints, printing ink, lacquers, grease, grime, and oil, has been announced by the Chase Chemical Co., 2901 Dover Ave., Cleveland 9, Ohio. Developed without harmful wax fillers, the cream guards the skin pores against the irritating causes of dermatitis, the manufacturer states.

Glov-Cote acts like a glove over the hands and arms, forming a protective film that washes off easily even with cold water. As it dissolves, the protective coating carries with it the paint, grease, ink, or grime that gathers under normal working conditions.

Krouse Magnifying Micrometer

A precision pocket tool for measuring the thickness of plating, paint, and enamels, known as the Krouse Magnifying Micrometer, is available from the Krouse Testing Machine Co., 573 E. 11th Ave., Columbus 3, Ohio.

The instrument is used to compare magnetic force measurements between a coating of unknown thickness and the tapered precision coating gage of similar base and coating magnetic characteristics. It may be used on sloping, overhead, or curved surfaces by holding the gage so that the Magnifying Micrometer is inclined at the same angle as used in the test, eliminating gravity effects.

Ceramid

A new synthetic wax, Ceramid, announced by the Glyco Products Co., Inc., 26 Court St., Brooklyn, N. Y., is now available in commercial quantities. Chemically it is an alkyl stearamide. It is hard, light yellow in color, and melts at a temperature of 176 deg. F. It is insoluble in water and is more soluble in or-

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A Very Merry Xmas and a Happy and Prosperous New Year

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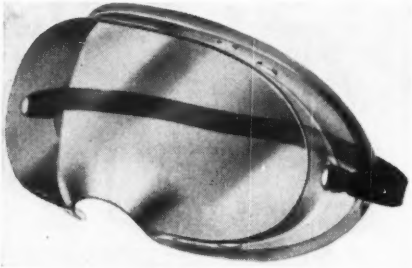
ganic solvents than natural and other commercial synthetic waxes. Absolute alcohol will dissolve 5.4 grams per 100 cc. In toluol and naphtha 3.8 and 3.4 grams respectively can be dissolved.

According to the manufacturer, Ceramid is compatible, in varying proportions with asphalt, cernauba wax, cumarone resins, ethyl cellulose, microcrystalline wax, paraffin wax, and Acrawax C. Its use is indicated for protective coatings and films to be deposited on various surfaces out of solvent solution. It emulsifies readily to provide a white matt finish which can be rubbed to give a high polish. It may be used as an anti-tack agent for resin organisols, as a mold lubricant for rubber and plastic goods, and to prevent sticking of finished articles. In most lacquers and enamels it dissolves clearly and serves as a flatting or gloss-reducing agent. In polishes, insulating compounds, and so on, it is used in blends with other waxes and hydrocarbons for special effects.

Coverlite Safety Goggle

The Coverlite Safety Goggle, product of the Chicago Eye Shield Co., 2300 Warren Blvd., Chicago 12, Ill., weighs less than an ounce but is claimed to be exceptionally sturdy. The injection molded, non-flammable plastic frame provides full protection from impact, dust, flying sparks, and chips. Ample air space and ventilation prevent fogging while the large frontal area provides a wide range of vision in all directions.

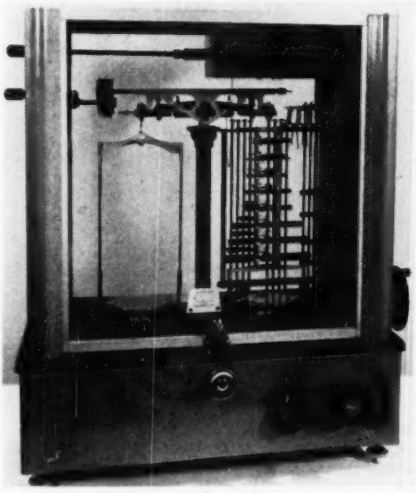
Ideal for buffing, polishing, light assembly, and spot welding, the Coverlite is available in clear, light green, or transparent frames. The design also permits comfortable wear over most types of personal glasses without interference to the wearer, the manufacturer states.



Coverlite Safety Goggle

Speedigram Analytical Balance

Permitting untrained personnel to weigh objects quickly with complete accuracy and without the use of computations or interpolation, the Speedigram Analytical Balance has been developed by Voland & Sons, Inc., New Rochelle, N. Y. The instrument reads directly up to 100 grams without weights; an extra 100 grams weight is supplied, however, so that the full capacity, 200 grams, is available. The sensitivity of the balance is 0.05 mg. at full load.



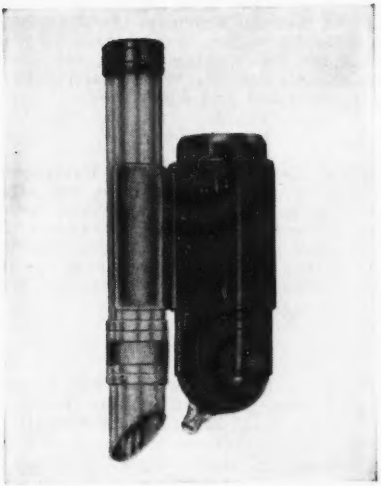
Speedigram Analytical Balance

Numerals appearing through the plate over the dials indicate the weights which will be deposited on the pan. Deposition is automatic when the beam is released. Readings are made across the dial so that no arithmetical sums need be computed.

The Speedigram has no complicated parts to get out of order, and its working parts are in full view.

Buhl S-129 Pocket Microscope Illuminator

Buhl Optical Co., Desk T-166, 1009 Beech Ave., Pittsburgh 12, Pa., has announced a special illuminator for use with its S-129 Pocket Microscope. The



Buhl S-129 Pocket Microscope Illuminator

microscope, having selective magnification ranging from 40 to 60 power, is used for inspecting raw materials, as well as cast, machined, and finished surfaces of all kinds

Employing a standard-size flashlight battery and bulb, the illuminator directs an oblique beam of light on the observed surface, furnishing illumination of uniform intensity throughout the field. It is attached to the microscope tube by means of a heavy spring clip and can be removed instantly when not required.

Oakite Composition No. 45

Oakite Composition No. 45, announced by Oakite Products Inc., 120 Thames St., New York 6, N. Y., has been designed specifically for keeping walls and working surfaces of water-washed paint spray booths clean and free of overspray, and is said to permit longer operation of paint spray booths between regularly scheduled maintenance cleanings.

According to the manufacturer, Oakite Composition No. 45 prevents the adherence of overspray to aprons, baffles, lines, and flood sheets of water-washed spray booths. It possesses the ability to float many of the commonly employed organic coatings; other coatings are emulsified and still others sludge out or settle to the bottom of the solution tank.

This material may also be used effectively for stripping organic finishes which coat paint racks, hooks, and similar spray booth equipment, it is said.

Rustarest No. 30

International Rustproof Corp., 12507 Plover Ave., Cleveland, Ohio, has placed on the market a rust preventive for use on aluminum, chrome, ferrous, or nonferrous metals. Known as Rustarest No. 30, it provides a coating over plated parts, as well as bare metal, and although hard and tough, is pliable enough to take bending or curving.

Rustarest No. 30 is a clear, transparent coating that dries quickly without need of baking. When used as a primer, it is said to prevent paint from chipping off, but the actual Rustarest coating will not chip or crack under any formal fabricating application. The product expands and contracts with the metal regardless of temperature extremes, intense vibration, or abnormal flexing, and prevents corrosion and rusting actions on parts during long shipments or storage, the manufacturer states.

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A white non-tarnishing finish similar to platinum and rhodium plating, but costing one-fifth as much. Used extensively in electronics to protect silver and other metals from tarnishing, in the optical industry, jewelry, etc.

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OTHER PRODUCTS:

RHODITE—rhodium plating solution
GOLDITE—sodium and potassium cyanide
SILVITE—silver cyanide salts
Gold, silver, platinum and palladium anodes

PRODUCT LITERATURE

The publications listed in this section may be obtained free upon written request on company letterhead to the manufacturers concerned. Your courtesy in mentioning PRODUCTS FINISHING when requesting copies of these publications will be sincerely appreciated by the manufacturer and the publisher of this magazine.

Cowles Metal Cleaners. The Cowles Chemical Co., 7018 Euclid Ave., Cleveland 3, Ohio, has available a folder containing data sheets on its Metal Cleaners for every type of soil and operation.

Speed-Wet Metalite Fibre Discs. Seven features of these discs are described and illustrated in a mailing piece prepared by Behr-Manning, Troy, New York.

Hydraulic Automatic Stroke Sander Leaflet. A two-color illustrated leaflet is available from the Curtis Machine Division, Lincoln Park Industries, Inc., Jamestown, New York, giving details and specifications of the Curtis 43R1-DB hydraulic double belt automatic stroke sander.

Acme Straight Line Automatic Polishing and Buffing Machines are the subject of an eight-page folder obtainable from the Acme Manufacturing Co., 1645 Howard St., Detroit 16, Mich. Each type is fully described and illustrated.

Alsop Liquid Processing Equipment. Filters, mixers, pumps, tanks, and other standard units which have been developed to meet the varying demands of its customers are shown and described in this 24-page catalog prepared by the Alsop Engineering Co., 404 Keen St., Milldale, Connecticut.

Dust Control Systems. This 12-page catalog was prepared by the Young & Bertke Co., 1124 Buck St., Cincinnati 14, Ohio, to provide those responsible for the installation of dust control systems in metal working and other industries with a brief survey of the Young & Bertke method of solving the dust problems created in various industrial plants. Typical installations are pictured and described.

Bede Paint and Air Heater, manufactured by Bede Products, Inc., 4311 Ridge Rd., Cleveland 9, Ohio, is the topic of a four-page circular. Operating characteristics, features, and advantages are cited.

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All paint restored to original consistency without opening the can.
2 minutes per gallon.
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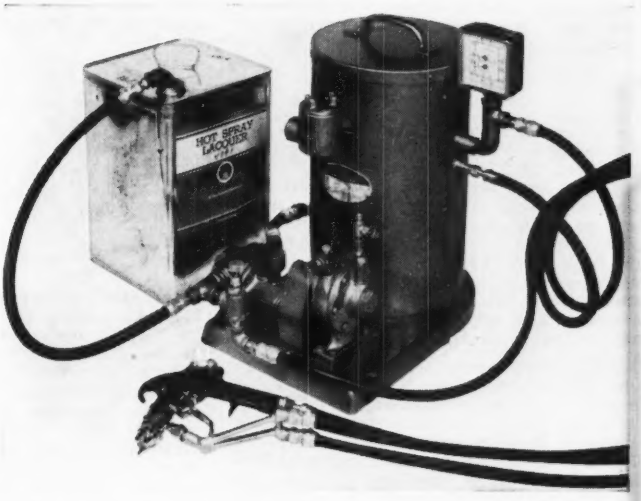

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Circulating Paint Heater

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With the UL tested Bede Paint Heater is now available a circulating arrangement which eliminates all of the recognized difficulties previously encountered with circulating paint heaters. Paint cannot clog shaft seal and the pump is long-lasting because it operates at 1/5 to 1/10 of speeds formerly required. Better quality paint films, fewer rejects, and decreased paint and labor costs are possible with the new Bede Circulating Heater.

- ***Explosion-proof Heater Tested and Passed by Underwriters***
- ***Accurate Temperature and Paint Pressure Control***
- ***The Newest, Most Modern Equipment Addition for Your Paint Department.***
- ***Rugged, Foolproof Construction***

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Link-Belt Folder No. 2327, obtainable from the Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill., describes and illustrates the Thru-Clean Bar Screen for efficient removal of trash and large solids from water and sewage in water, sewage, and industrial waste treatment plants.

Chromalox Electric Heating Units and Equipment. Prepared by the Edwin L. Wiegand Co., 7552 Thomas Blvd., Pittsburgh 8, Pa., Industrial Catalog 50 lists a wide variety of standard electric heating units, many of them entirely new. Strips, rings, tubulars, and cartridges, the four basic chromalox units, with wide variations in wattage, voltage, and sheath material, are listed, as well as easy selection and application data. Complete assembled heating equipment is also shown.

Zapon Primers and Primer Surfacers. In a folder issued by the Industrial Finishes Dept., Atlas Powder Co., Stamford, Conn., and North Chicago, Ill., properties of the various materials are listed in chart form with recommendations given for particular types of surfacers and end uses. Points on adhesion, corrosion, and appearance are also explained as being instrumental factors in the final selection of a primer or primer surfacer.

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"Liquimatic," a liquid buffing compound, is the subject of a four-page, two-color reference catalog published by the J. C. Miller Co., 55 Mt. Vernon Ave., N. W., Grand Rapids 4, Mich. Covered are the properties of Liquimatic, its uses, applications, and advantages.

"A Report on Removing Burrs with Power Brushes" is the title of a 16-page manual prepared by the Technical Department of The Osborn Manufacturing Co., Dept. 161, 5401 Hamilton Ave., Cleveland 14, Ohio. Specifications of a variety of brushes are included in tabular form.

Bulletin No. 44-949, issued by the Morse Mfg. Co., Inc., 124 Dickerson, Syracuse 2, N. Y., describes and illustrates the Morse "Rock-a-Drum" Vertical Drum Truck with which one man can easily and safely position heavy drum loads of paints, lacquers, chemicals, emulsions, and all types of liquids and semi-liquids 15 inches above the floor for side drainage.

Metal Cleaning. Turco materials and methods for the metal-working plant are the subject of a 20-page manual published by Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, California. Many illustrations accompany the text.

Wyco No. 50 Catalog, announced by Wyzenbeek & Staff, Inc., 821 W. Hubbard St., Chicago 22, Ill., contains complete information on Wyco Flexible Shafts and Grinders. New model single and multiple speed flexible shaft machines are introduced, together with illustrations and important operating data. Parts and accessories are illustrated for better understanding, with explanatory details on grinding, sanding, wire brushing, polishing, deburring, and many other operations.

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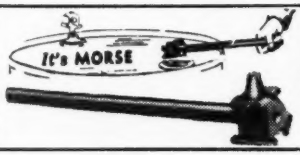

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Reference File Folders. A set of convenient reference file folders of interest to those engaged in metal cleaning and other users of industrial chemicals is available from Klem Chemicals, Inc., 14401 Lanson, Dearborn, Mich. Attractively printed in two colors on durable stock, the folders facilitate filing of technical information under four general headings, Paint Removal, Phosphate Coatings, Metal Cleaning, and Spray Booth Maintenance. The cover of each folder provides brief descriptions of the complete line of various compounds and chemicals available from the company, along with the free technical advisory service furnished by Klem service engineers.

"Electroplating Know How." This is an outline of a correspondence electroplating course offered by Joseph B. Kushner, Electroplating Engineer, Stroudsburg, Pa. Brief facts regarding his qualifications are given, and a standard enrollment form is included.

Vapor Degreaser Manual. The Optimus Equipment Co., 15 Water St., Matawan, N. J., has available a 24-page manual describing and illustrating the design, installation, operation, and maintenance of vapor degreasers.

Surface Preparation. Surface preparation of metals with Oakite materials and methods before black oxide finishing is thoroughly discussed in a 20-page pocket-size manual issued by Oakite Products, Inc., 20 Thames St., New York 6, New York.

Protective Coating Resins Properties Chart, listing the physical properties, viscosities in oil and toluol, solubilities in solvents, compatibilities with wax and ethyl cellulose, and the suggested end uses for the resins produced by Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y., is available to the paint and varnish industries. It is available in two sizes, one 20 x 31 inches designed for the laboratory wall, and the other, 8½ x 11 inches suitable for ring binders and file folders.

"The Production Story" is the title of an eight-page folder which briefly illustrates and describes the many different centerless buffing and polishing, surfacing and straight line finishing machines manufactured by the Production Machine Co., Greenfield, Massachusetts.

Bulletin G-2, distributed by the Hanson-Van Winkle-Munning Co., Matawan, N. J., discusses fully its Cobalt Nickel Plating Processes.

A price list on **"Wakefield Amalgamated" Lead-Lined Products** can be obtained from Lead Lined Iron Pipe Co., 33 Broadway, Wakefield, Massachusetts.

Industrial Thermometers. Complete data on liquid-in-glass industrial thermometers is presented in an easy-to-use tabular and sectionalized form in Bulletin "E", published by the Precision Thermometer and Instrument Co., 1588 Brandywine St., Philadelphia 30, Pennsylvania.

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"Duridizing," a rapid and simple sludge-free phosphatizing process which provides streamlined rustproofing and promotes long paint life, is the subject of Technical Service Data Sheet No. 3-2-210, published by the American Chemical Paint Co., Ambler, Pa. Typical process sequences for Duridizing are given.

Manhattan Moldisc, a new bonded disc wheel for rotary sanders, is fully covered in Bulletin No. 6901-A, which may be obtained by writing the Abrasive Wheel Dept., Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, New Jersey.

"How to Install and Operate Your Durcopump" is the title of Bulletin 812A, a revised instruction booklet on the installation and operation of centrifugal pumps in corrosive service which has been issued by The Duriron Co., Dayton 1, Ohio. While dealing specifically with Durcopumps, the information in the twelve varnished, smudge-proof pages is applicable to all centrifugal pumps.

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MPC Piping, typical industries served, and the correct piping for each chemical product are presented in tabular form in a four-page two-color folder prepared by the Michigan Pipe Co., Bay City, Michigan.

Cellolyn 502, a high performance resin for top quality baking whites, and for sunlight-resistant clear lacquers, is fully covered in Technical Sales Bulletin S-46, available from the Hercules Powder Co., Wilmington, Delaware.

Graco Paintmaster is an air-operated unit which pumps paint, enamel, lacquer, and other finishing materials direct from original containers, and it is fully described in an eight-page catalog issued by the Gray Company, Inc., 40 Eleventh Ave., N.E., Minneapolis 13, Minnesota.

Enthone Metal Cleaners. Enthone, Inc., Dept. PF, 442 Elm St., New Haven 2, Conn., has announced the availability of five bulletins descriptive of: Zinc Cleaner 20, an anodic electrocleaner for processing zinc base die castings prior to plating with copper or nickel; Aluminum Cleaner "E", an etching type alkaline cleaner for aluminum; Aluminum Cleaner "NE", a non-etching type aluminum cleaner; Cleaner 100, an alkaline, anodic electrocleaner for steel; and Brass Cleaner, an alkaline cleaner for non-ferrous metals, including copper, brass, tin alloys, and lead alloys.

Hammond "Super" Rotary Automatic for Grinding, Polishing, Buffing, and Deburring. Bulletin No. 45, published by the Hammond Machinery Builders Inc., 1622 Douglas Ave., Kalamazoo, Mich., includes illustrations, descriptions, and specifications of this machine.

Blakeslee Solvent Vapor Degreasers, their operating characteristics, features, and advantages are explained and illustrated in full detail in a 20-page booklet issued by G. S. Blakeslee & Co., Cicero Station, Chicago 50, Ill. Auxiliary equipment is also pictured and described.

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Opportunity Section

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This 50 year old well known company is broadening its field of operation and requires services of technically able paint sales engineers with or without established contacts in Chicago, Detroit, Pittsburgh, Milwaukee. This is a real opportunity. Write in confidence Box No. 129, c/o Products Finishing, 431 Main Street, Cincinnati 2, Ohio.

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Bulletin No. 654 on the **15-Inch Continuous Wheelabrator Tumblast** for cleaning metal parts in a continuous flow is complete with pictures, drawings, specifications, and details of construction and operation, and may be obtained from the American Wheelabrator and Equipment Corp., 555 S. Byrkit St., Mishawaka, Indiana.

Pyro Surface Pyrometer. Catalog No. 180, issued by The Pyrometer Instrument Co. Inc., Bergenfield, N. J., illustrates and describes the Pyro Surface Pyrometer, an accurate and universally adaptable method for determining surface and sub-surface temperatures in almost every conceivable industrial plant or laboratory.

Catalogs

FOR YOUR LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Finishing Equipment

"Mahon Industrial Equipment," including Complete Finishing Systems for Enamel; Lacquer; Paint and Varnish; Spray Pickling Equipment; Metal Cleaning and Rust Proofing Equipment; Dry-off Ovens; Filtered Air Supply Systems; Hydro-Filter Spray Booths; Drying and Baking Ovens; Core Ovens; Dust Collecting Systems, is described in a booklet available from R. C. Mahon Company, Detroit 11, Michigan.

2. Solvent Degreasing

A 16-page booklet which emphasizes fundamental practices for the economical use of degreasing solvents in metal cleaning departments of industrial plants has been published by the Detrex Corp., Detroit 32, Michigan.

3. Cellolyn 502 Resin

The Hercules Powder Co., Wilmington, Del., has available Technical Sales Bulletin S-46 which describes Cellolyn 502, a high performance resin for top quality baking whites, and for sunlight-resistant clear lacquers.

4. Industrial Lacquers

A color card containing samples of the variety of colors of Pittsburgh industrial lacquers for wood and metal, together with suggestions for application of the lacquers, has been issued by the Pittsburgh Plate Glass Co., Industrial Paint Division, Pittsburgh, Pennsylvania.

5. Electroplating Tape

Physical and chemical properties of "Scotch" electroplating tape, general functions in electroplating, insulation protection, and application procedure for plating racks are contained in a data sheet published by the Minnesota Mining & Manufacturing Co., St. Paul 6, Minn.

6. Tank Heater

"Platecoil," a lightweight embossed plate for tank heating, is discussed as to installation, operation, features, and advantages in a bulletin released by the Kold-Hold Manufacturing Co., Lansing, Michigan.

7. Motor Generators

Bulletin G-102 describing its motor generator sets has been issued by the Hanson-Van Winkle-Munning Co., Matawan, New Jersey.

8. Industrial Washing Machines

Factors to be considered in making a proper choice of equipment for thoroughly cleaning metal products are described in a 28-page book published by The Alvey-Ferguson Co., Cincinnati 9, Ohio.

9. Corrosion-Proof Pumps

The Duriron Co., Dayton 1, Ohio, is offering Bulletin 812A, a revised instruction booklet on the installation and operation of centrifugal pumps in corrosive service.

10. Reverse Current Cleaners

Oakite Composition No. 90 for anodic or reverse current cleaning of steel is the subject of a 12-page pocket-size folder available from Oakite Products, Inc., New York 6, New York.

11. Buffs

A folder describing in detail the advantages of Jackson Airway Ventilated Buffs is available from the Jackson Buff Corp., Long Island City 1, New York.

12. Dust Control Systems

Young & Bertke Co., Cincinnati, Ohio, has prepared a booklet picturing and describing its method of solving the dust problems created in various industrial plants.

13. Black Finish

"Pentrate," a process for applying a protective, penetrating black finish to steel, is fully explained in a 20-page catalog issued by the Heatbath Corp., Springfield, Massachusetts.

14. Insulated Anode Hook

A leaflet describing the "Uzall" Plating Hook for elliptical anodes which permits the entire anode to be completely immersed can be obtained from The Udylite Corp., Detroit 11, Michigan.

15. Synthetic Finish

"Dimenso," a synthetic finish that is designed to provide two colors in one spray operation, is described in a booklet now available from The Sherwin-Williams Co., Cleveland 1, Ohio.

16. Duridizing

A rapid and simple sludge-free phosphatizing process which provides streamlined rustproofing and promotes long paint life, Duridizing is the subject of Technical Service Data Sheet No. 3-2-210, published by the American Chemical Paint Co., Ambler, Pennsylvania.

17. Degreaser Manual

The Optimus Equipment Co., Matawan, N. J., has available a 24-page manual describing and illustrating the design, installation, operations, and maintenance of vapor degreasers.

18. Infra-Red Ovens and Conveyors

A 20-page catalog published by Jensen Specialties, Inc., Detroit 27, Mich., illustrates and explains the advantages of coordinating infra-red ovens with conveyors in performing baking, drying, preheating and dehydrating operations.

19. Dust Eliminators

A 12-page folder prepared by Schmieg Industries, Inc., Detroit 2, Mich., presents illustrated, descriptive, and blueprint data on a complete line of swirl type dust and fume eliminators.

20. Cleaners

Parco Cleaners, emulsion and solvent type, acid and alkali type cleaners, are described in a technical publication prepared by the Parker Rust Proof Co., Detroit, Michigan.

21. Refinishers' Price List

The Rinshed-Mason Co., Detroit 10, Mich., has available Refinishers' Price List No. 107 which lists and describes each item of its line of automotive undercoats and finishing materials.

22. Industrial Ovens

The Kirk & Blum Manufacturing Co., Cincinnati 25, Ohio, has published a descriptive catalog showing installation views of its wide variety of industrial ovens in various types of plants.

23. Silicone-Base Finish

Properties of Mico silicone-base aluminum finish and product applications for the finish are outlined in a folder issued by Midland Industrial Finishes Co., Waukegan, Illinois.

24. Troxide Bulletin

Troxide, dry acid salt compound for pickling prior to porcelain enameling, is described in a technical bulletin, issued by MacDermid Inc., Waterbury 88, Connecticut.

25. Clear Lacquer

The Randolph Products Co., Carlstadt, N. J., has issued a folder which contains helpful, technical, and factual information on clear lacquer.

26. Air Compressors

Bulletin CK-101 providing full details on its 7½, 10, and 15 h.p., 4-cylinder "V" type air compressors can be obtained from The DeVilbiss Co., Toledo, Ohio.

27. General Purpose Cleaner

A four page folder published by the Pennsylvania Salt Manufacturing Co., Philadelphia 7, Pa., describes Pennsalt MC-1, a cleaner for general maintenance use, steam gun cleaning, and tumble barrel cleaning.

28. Centerless Finishing Machines

"The Production Story" is the title of a folder which briefly illustrates and describes the many different centerless buffing and polishing, surfacing and straight line finishing machines manufactured by the Production Machine Co., Greenfield, Massachusetts.

29. Degreasing Solvent

A leaflet outlining the details of an improved Blacosolv Degreasing Solvent which incorporates new and improved stabilizers can be obtained from G. S. Blakeslee & Co., Chicago 50, Illinois.

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